

ASME

- Wrought Steel Butt-Weld Fittings __ P16~P43
- Stainless Steel Butt-Weld Fittings __ P44~P52
- Wrought Steel Butt-Weld Fittings __ P53~P58

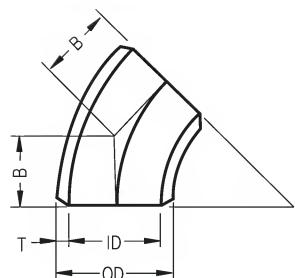
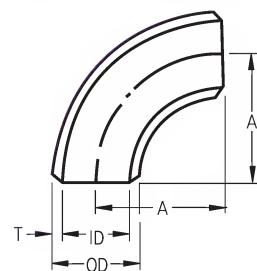
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Wrought Steel Butt - Weld Fittings

90° Elbows(Long)
45° Elbows(Long)

STD (Sch 40)



(in inches)

ASME B16.9

Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A	Center to End B
1/2	0.840	0.622	0.109	1 1/2	5/8
5/8	1.050	0.824	0.113	1 1/2	3/4
1	1.315	1.049	0.133	1 1/2	7/8
1 1/4	1.660	1.380	0.140	1 7/8	1
1 1/2	1.900	1.610	0.145	2 1/4	1 1/8
2	2.375	2.067	0.154	3	1 3/8
2 1/2	2.875	2.469	0.203	3 3/4	1 3/4
3	3.500	3.068	0.216	4 1/2	2
3 1/2	4.000	3.548	0.226	5 1/4	2 1/4
4	4.500	4.026	0.237	6	2 1/2
5	5.563	5.047	0.258	7 1/2	3 1/8
6	6.625	6.065	0.280	9	3 3/4
8	8.625	7.981	0.322	12	5
10	10.750	10.020	0.365	15	6 1/4
12	12.750	12.000	0.375	18	7 1/2
*12	12.750	11.938	0.406	18	7 1/2
14	14.000	13.250	0.375	21	8 3/4
*14	14.000	13.124	0.438	21	8 3/4
16	16.000	15.250	0.375	24	10
*16	16.000	15.000	0.500	24	10
18	18.000	17.250	0.375	27	11 1/4
*18	18.000	16.876	0.562	27	11 1/4
20	20.000	19.250	0.375	30	12 1/2
*20	20.000	18.812	0.594	30	12 1/2
22	22.000	21.250	0.375	33	13 1/2
24	24.000	23.250	0.375	36	15
*24	24.000	22.624	0.688	36	15
26	26.000	25.250	0.375	39	16
28	28.000	27.250	0.375	42	17 1/4
30	30.000	29.250	0.375	45	18 1/2

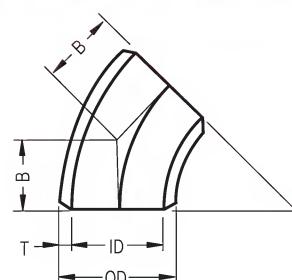
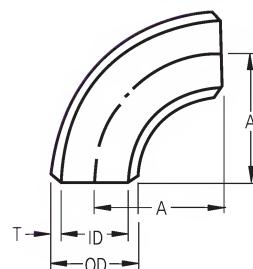
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Asterisks (*) Denote Sch 40
- Wall Thickness Conform to ASME B 36.10M Specifications for STD and Sch 40 Wall Pipe

Wrought Steel Butt - Weld Fittings



90° Elbows(Long)
45° Elbows(Long)

STD (Sch 40)



ASME B16.9

(in inches)

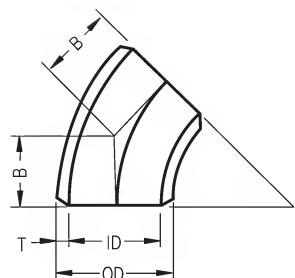
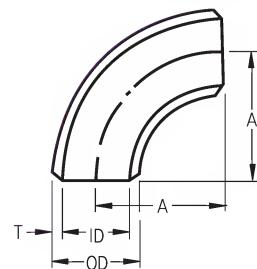
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A	Center to End B
32	32.000	31.250	0.375	48	19 $\frac{3}{4}$
*32	32.000	30.624	0.688	48	19 $\frac{3}{4}$
34	34.000	33.250	0.375	51	21
*34	34.000	32.624	0.688	51	21
36	36.000	35.250	0.375	54	22 $\frac{1}{4}$
*36	36.000	34.500	0.750	54	22 $\frac{1}{4}$
38	38.000	37.250	0.375	57	23 $\frac{5}{8}$
40	40.000	39.250	0.375	60	24 $\frac{7}{8}$
42	42.000	41.250	0.375	63	26
44	44.000	43.250	0.375	66	27 $\frac{3}{8}$
46	46.000	45.250	0.375	69	28 $\frac{5}{8}$
48	48.000	47.250	0.375	72	29 $\frac{7}{8}$
50	50.000	49.250	0.375	75	31 $\frac{1}{8}$
52	52.000	51.250	0.375	78	32 $\frac{1}{4}$
54	54.000	53.250	0.375	81	33 $\frac{1}{2}$
56	56.000	55.250	0.375	84	34 $\frac{3}{4}$
58	58.000	57.250	0.375	87	36
60	60.000	59.250	0.375	90	37 $\frac{1}{4}$
62	62.000	61.250	0.375	93	38 $\frac{1}{2}$
64	64.000	63.250	0.375	96	39 $\frac{3}{4}$
66	66.000	65.250	0.375	99	41
68	68.000	67.250	0.375	102	42 $\frac{1}{4}$
70	70.000	69.250	0.375	105	43 $\frac{1}{2}$
72	72.000	71.250	0.375	108	44 $\frac{3}{4}$
74	74.000	73.250	0.375	111	46
76	76.000	75.250	0.375	114	47 $\frac{1}{4}$
78	78.000	77.250	0.375	117	48 $\frac{1}{2}$
80	80.000	79.250	0.375	120	49 $\frac{3}{4}$
82	82.000	81.250	0.375	123	51
84	84.000	83.250	0.375	126	52 $\frac{1}{4}$

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Asterisks (*) Denote Sch 40
- Wall Thickness Conform to ASME B 36.10M Specifications for STD and Sch 40 Wall Pipe

Wrought Steel Butt - Weld Fittings

90° Elbows(Long)
45° Elbows(Long)

XS (Sch 80)



(in inches)

ASME B16.9

Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A	Center to End B
1/2	0.840	0.546	0.147	1 1/2	5/8
5/8	1.050	0.742	0.154	1 1/2	3/4
1	1.315	0.957	0.179	1 1/2	7/8
1 1/4	1.660	1.278	0.191	1 7/8	1
1 1/2	1.900	1.500	0.200	2 1/4	1 1/8
2	2.375	1.939	0.218	3	1 3/8
2 1/2	2.875	2.323	0.276	3 3/4	1 3/4
3	3.500	2.900	0.300	4 1/2	2
3 1/2	4.000	3.364	0.318	5 1/4	2 1/4
4	4.500	3.826	0.337	6	2 1/2
5	5.563	4.813	0.375	7 1/2	3 1/8
6	6.625	5.761	0.432	9	3 3/4
8	8.625	7.625	0.500	12	5
10	10.750	9.750	0.500	15	6 1/4
*10	10.750	9.562	0.594	15	6 1/4
12	12.750	11.750	0.500	18	7 1/2
*12	12.750	11.374	0.688	18	7 1/2
14	14.000	13.000	0.500	21	8 3/4
*14	14.000	12.500	0.750	21	8 3/4
16	16.000	15.000	0.500	24	10
*16	16.000	14.312	0.844	24	10
18	18.000	17.000	0.500	27	11 1/4
*18	18.000	16.124	0.938	27	11 1/4
20	20.000	19.000	0.500	30	12 1/2
*20	20.000	17.938	1.031	30	12 1/2
22	22.000	21.000	0.500	33	13 1/2
*22	22.000	19.750	1.125	33	13 1/2
24	24.000	23.000	0.500	36	15
*24	24.000	21.562	1.219	36	15
26	26.000	25.000	0.500	39	16

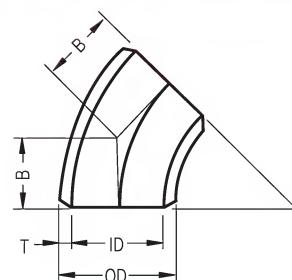
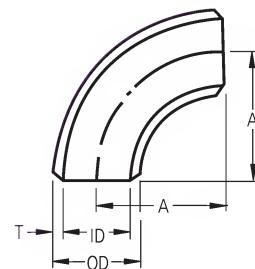
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Asterisks (*) Denote Sch 80
- Wall Thickness Conform to ASME B 36.10M Specifications for STD and Sch 40 Wall Pipe

Wrought Steel Butt - Weld Fittings



90° Elbows(Long)
45° Elbows(Long)

XS (Sch 80)



ASME B16.9

(in inches)

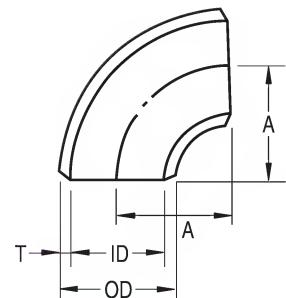
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A	Center to End B
28	28.000	27.000	0.500	42	17 $\frac{1}{4}$
30	30.000	29.000	0.500	45	18 $\frac{1}{2}$
32	32.000	31.000	0.500	48	19 $\frac{3}{4}$
34	34.000	33.000	0.500	51	21
36	36.000	35.000	0.500	54	22 $\frac{1}{4}$
38	38.000	37.000	0.500	57	23 $\frac{5}{8}$
40	40.000	39.000	0.500	60	24 $\frac{7}{8}$
42	42.000	41.000	0.500	63	26
44	44.000	43.000	0.500	66	27 $\frac{3}{8}$
46	46.000	45.000	0.500	69	28 $\frac{5}{8}$
48	48.000	47.000	0.500	72	29 $\frac{7}{8}$
50	50.000	49.000	0.500	75	31 $\frac{1}{6}$
52	52.000	51.000	0.500	78	32 $\frac{1}{4}$
54	54.000	53.000	0.500	81	33 $\frac{1}{2}$
56	56.000	55.000	0.500	84	34 $\frac{3}{4}$
58	58.000	57.000	0.500	87	36
60	60.000	59.000	0.500	90	37 $\frac{1}{4}$
62	62.000	61.000	0.500	93	38 $\frac{1}{2}$
64	64.000	63.000	0.500	96	39 $\frac{3}{4}$
66	66.000	65.000	0.500	99	41
68	68.000	67.000	0.500	102	42 $\frac{1}{4}$
70	70.000	69.000	0.500	105	43 $\frac{1}{2}$
72	72.000	71.000	0.500	108	44 $\frac{3}{4}$
74	74.000	73.000	0.500	111	46
76	76.000	75.000	0.500	114	47 $\frac{1}{4}$
78	78.000	77.000	0.500	117	48 $\frac{1}{2}$
80	80.000	79.000	0.500	120	49 $\frac{3}{4}$
82	82.000	81.000	0.500	123	51
84	84.000	83.000	0.500	126	52 $\frac{1}{4}$

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Asterisks (*) Denote Sch 80
- Wall Thickness Conforms to ASME B 36.10M Specifications for STD and Sch 40 Wall Pipe

Wrought Steel Butt - Weld Fittings

90° Elbows(Short)

STD (Sch 40)



ASME B16.9

(in inches)

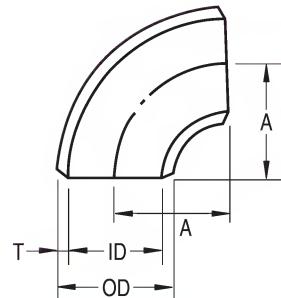
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A
1	1.315	1.049	0.133	1
1 1/4	1.660	1.380	0.140	1 1/4
1 1/2	1.900	1.610	0.145	1 1/2
2	2.375	2.067	0.154	2
2 1/2	2.875	2.469	0.203	2 1/2
3	3.500	3.068	0.216	3
3 1/2	4.000	3.548	0.226	3 1/2
4	4.500	4.026	0.237	4
5	5.563	5.047	0.258	5
6	6.625	6.065	0.280	6
8	8.625	7.981	0.322	8
10	10.750	10.020	0.365	10
12	12.750	12.000	0.375	12
*12	12.750	11.938	0.406	12
14	14.000	13.250	0.375	14
*14	14.000	13.124	0.438	14
16	16.000	15.250	0.375	16
*16	16.000	15.000	0.500	16
18	18.000	17.250	0.375	18
*18	18.000	16.876	0.562	18
20	20.000	19.250	0.375	20
*20	20.000	18.812	0.594	20
22	22.000	21.250	0.375	22
24	24.000	23.250	0.375	24
*24	24.000	22.624	0.688	24
26	26.000	25.250	0.375	26
28	28.000	27.250	0.375	28
30	30.000	29.250	0.375	30

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Asterisks(*) Denote Sch 40
- Wall Thickness Conform to ASME B 36.10M Specifications for STD and Sch 40 Wall Pipe



90° Elbows(Short)

STD (Sch 40)



ASME B16.9

(in inches)

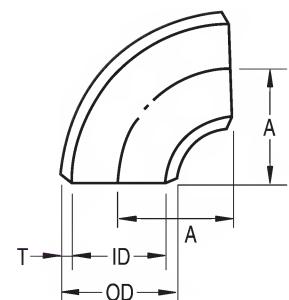
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A
32	32.000	31.250	0.375	32
*32	32.000	30.624	0.688	32
34	34.000	33.250	0.375	34
*34	34.000	32.624	0.688	34
36	36.000	35.250	0.375	36
*36	36.000	34.500	0.750	36
38	38.000	37.250	0.375	38
40	40.000	39.250	0.375	40
42	42.000	41.250	0.375	42
44	44.000	43.250	0.375	44
46	46.000	45.250	0.375	46
48	48.000	47.250	0.375	48
50	50.000	49.250	0.375	50
52	52.000	51.250	0.375	52
54	54.000	53.250	0.375	54
56	56.000	55.250	0.375	56
58	58.000	57.250	0.375	58
60	60.000	59.250	0.375	60
62	62.000	61.250	0.375	62
64	64.000	63.250	0.375	64
66	66.000	65.250	0.375	66
68	68.000	67.250	0.375	68
70	70.000	69.250	0.375	70
72	72.000	71.250	0.375	72
74	74.000	73.250	0.375	74
76	76.000	75.250	0.375	76
78	78.000	77.250	0.375	78
80	80.000	79.250	0.375	80

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Asterisks (*) Denote Sch 40
- Wall Thickness Conform to ASME B 36.10M Specifications for STD and Sch 40 Wall Pipe

Wrought Steel Butt - Weld Fittings

90° Elbows(Short)

XS (Sch 80)



ASME B16.9

(in inches)

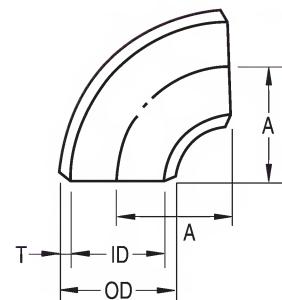
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A
1	1.315	0.957	0.179	1
1 1/4	1.660	1.278	0.191	1 1/4
1 1/2	1.900	1.500	0.200	1 1/2
2	2.375	1.939	0.218	2
2 1/2	2.875	2.323	0.276	2 1/2
3	3.500	2.900	0.300	3
3 1/2	4.000	3.364	0.318	3 1/2
4	4.500	3.826	0.337	4
5	5.563	4.813	0.375	5
6	6.625	5.761	0.432	6
8	8.625	7.625	0.500	8
10	10.750	9.750	0.500	10
*10	10.750	9.562	0.594	10
12	12.750	11.750	0.500	12
*12	12.750	11.374	0.688	12
14	14.000	13.000	0.500	14
*14	14.000	12.500	0.750	14
16	16.000	15.000	0.500	16
*16	16.000	14.312	0.844	16
18	18.000	17.000	0.500	18
*18	18.000	16.124	0.938	18
20	20.000	19.000	0.500	20
*20	20.000	17.938	1.031	20
22	22.000	21.000	0.500	22
*22	22.000	19.750	1.125	22
24	24.000	23.000	0.500	24
*24	24.000	21.562	1.219	24
26	26.000	25.000	0.500	26

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Wall Thickness Conform to ASME B 36.10M Specifications for XS and Sch 80 Wall Pipe
- Asterisks(*) Denote Sch 80



90° Elbows(Short)

XS (Sch 80)



ASME B16.9

(in inches)

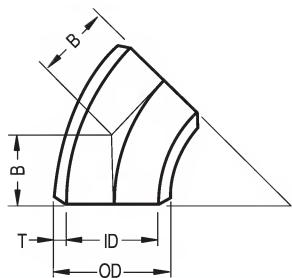
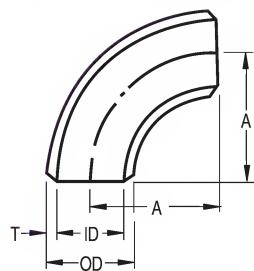
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Center to End A
28	28.000	27.000	0.500	28
30	30.000	29.000	0.500	30
32	32.000	31.000	0.500	32
34	34.000	33.000	0.500	34
36	36.000	35.000	0.500	36
38	38.000	37.000	0.500	38
40	40.000	39.000	0.500	40
42	42.000	41.000	0.500	42
44	44.000	43.000	0.500	44
46	46.000	45.000	0.500	46
48	48.000	47.000	0.500	48
50	50.000	49.000	0.500	50
52	52.000	51.000	0.500	52
54	54.000	53.000	0.500	54
56	56.000	55.000	0.500	56
58	58.000	57.000	0.500	58
60	60.000	59.000	0.500	60
62	62.000	61.000	0.500	62
64	64.000	63.000	0.500	64
66	66.000	65.000	0.500	66
68	68.000	67.000	0.500	68
70	70.000	69.000	0.500	70
72	72.000	71.000	0.500	72
74	74.000	73.000	0.500	74
76	76.000	75.000	0.500	76
78	78.000	77.000	0.500	78
80	80.000	79.000	0.500	80

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Wall Thickness Conform to ASME B 36.10M Specifications for XS and Sch 80 Wall Pipe
- Asterisks (*) Denote Sch 80

Wrought Steel Butt - Weld Fittings

90° Elbows(Long, Short)
45° Elbows(Long, Short)

Sch20,60,100,120,140,160,XXS



ASME B16.9

(in inches)

Nominal Pipe Size	Outside Diameter OD	Wall Thickness T							Center to End		
		Sch 20	Sch 60	Sch 100	Sch 120	Sch 140	Sch 160	XXS	Long	Short	Long
$\frac{1}{2}$	0.840	—	—	—	—	—	0.188	0.294	$1\frac{1}{2}$		$\frac{5}{8}$
$\frac{3}{4}$	1.050	—	—	—	—	—	0.219	0.308	$1\frac{1}{2}$		$\frac{7}{16}$
1	1.315	—	—	—	—	—	0.250	0.358	$1\frac{1}{2}$	1	$\frac{7}{8}$
$1\frac{1}{4}$	1.660	—	—	—	—	—	0.250	0.382	$1\frac{7}{8}$	$1\frac{1}{4}$	1
$1\frac{1}{2}$	1.900	—	—	—	—	—	0.281	0.400	$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{8}$
2	2.375	—	—	—	—	—	0.344	0.436	3	2	$1\frac{3}{8}$
$2\frac{1}{2}$	2.875	—	—	—	—	—	0.375	0.552	$3\frac{3}{4}$	$2\frac{1}{2}$	$1\frac{3}{4}$
3	3.500	—	—	—	—	—	0.438	0.600	$4\frac{1}{2}$	3	2
4	4.500	—	—	—	0.438	—	0.531	0.674	6	4	$2\frac{1}{2}$
5	5.563	—	—	—	0.500	—	0.625	0.750	$7\frac{1}{2}$	5	$3\frac{1}{8}$
6	6.625	—	—	—	0.562	—	0.719	0.864	9	6	$3\frac{3}{4}$
8	8.625	0.250	0.406	0.594	0.719	0.812	0.906	0.875	12	8	5
10	10.750	0.250	0.500	0.719	0.844	1.000	1.125	1.000	15	10	$6\frac{1}{4}$
12	12.750	0.250	0.562	0.844	1.000	1.125	1.312	1.000	18	12	$7\frac{1}{2}$
14	14.000	0.312	0.594	0.938	1.094	1.250	1.406	—	21	14	$8\frac{3}{4}$
16	16.000	0.312	0.656	1.031	1.219	1.438	1.594	—	24	16	10
18	18.000	0.312	0.750	1.156	1.375	1.562	1.781	—	27	18	$11\frac{1}{4}$
20	20.000	0.375	0.812	1.281	1.500	1.750	1.969	—	30	20	$12\frac{1}{2}$
22	22.000	0.375	0.875	1.375	1.625	1.875	2.125	—	33	22	$13\frac{1}{2}$
24	24.000	0.375	0.969	1.531	1.812	2.062	2.344	—	36	24	15

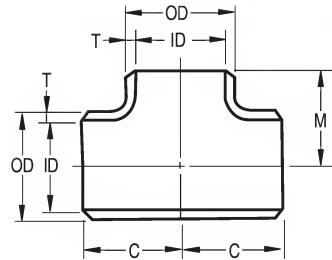
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Wall Thickness Conform to ASME B 36.10M Specifications

Wrought Steel Butt - Weld Fittings



Tees (Straight)

STD (Sch 40), XS(Sch 80)



ASME B16.9

(in inches)

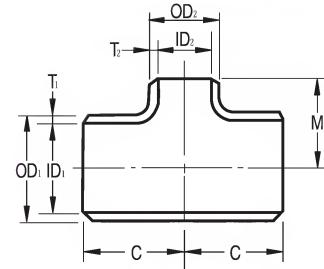
Nominal Pipe Size	Outside Diameter OD	STD(Sch 40)		XS(Sch 80)		Center to End	
		ID	T	ID	T	Run C	Outlet M
1/2	0.840	0.622	0.109	0.546	0.147	1	1
5/8	1.050	0.824	0.113	0.742	0.154	1 1/8	1 1/8
1	1.315	1.049	0.133	0.957	0.179	1 1/2	1 1/2
1 1/4	1.660	1.380	0.140	1.278	0.191	1 7/8	1 7/8
1 1/2	1.900	1.610	0.145	1.500	0.200	2 1/4	2 1/4
2	2.375	2.067	0.154	1.939	0.218	2 1/2	2 1/2
2 1/2	2.875	2.469	0.203	2.323	0.276	3	3
3	3.500	3.068	0.216	2.900	0.300	3 3/8	3 3/8
3 1/2	4.000	3.548	0.226	3.364	0.318	3 3/4	3 3/4
4	4.500	4.026	0.237	3.826	0.337	4 1/8	4 1/8
5	5.563	5.047	0.258	4.813	0.375	4 7/8	4 7/8
6	6.625	6.065	0.280	5.761	0.432	5 5/8	5 5/8
8	8.625	7.981	0.322	7.625	0.500	7	7
10	10.750	10.020	0.365	9.750	0.500	8 1/2	8 1/2
*10	10.750	—	—	9.562	0.594	8 1/2	8 1/2
12	12.750	12.000	0.375	11.750	0.500	10	10
*12	12.750	11.938	0.406	11.374	0.688	10	10
14	14.000	13.250	0.375	13.000	0.500	11	11
*14	14.000	13.124	0.438	12.500	0.750	11	11
16	16.000	15.250	0.375	15.000	0.500	12	12
*16	16.000	15.000	0.500	14.312	0.844	12	12
18	18.000	17.250	0.375	17.000	0.500	13 1/2	13 1/2
*18	18.000	16.876	0.562	16.124	0.938	13 1/2	13 1/2
20	20.000	19.250	0.375	19.000	0.500	15	15
*20	20.000	18.812	0.594	17.938	1.031	15	15
22	22.000	21.250	0.375	21.000	0.500	16 1/2	16 1/2
*22	22.000	—	—	19.750	1.125	16 1/2	16 1/2
24	24.000	23.250	0.375	23.000	0.500	17	17
*24	24.000	22.624	0.688	21.562	1.219	17	17
26	26.000	25.250	0.375	25.000	0.500	19 1/2	19 1/2
28	28.000	27.250	0.375	27.000	0.500	20 1/2	20 1/2
30	30.000	29.250	0.375	29.000	0.500	22	22
32	32.000	31.250	0.375	31.000	0.500	23 1/2	23 1/2
*32	32.000	30.624	0.688	—	—	23 1/2	23 1/2
34	34.000	33.250	0.375	33.000	0.500	25	25
*34	34.000	32.624	0.688	—	—	25	25
36	36.000	35.250	0.375	35.000	0.500	26 1/2	26 1/2
*36	36.000	34.500	0.750	—	—	26 1/2	26 1/2
38	38.000	37.250	0.375	37.000	0.500	28	28
40	40.000	39.250	0.375	39.000	0.500	29 1/2	29 1/2
42	42.000	41.250	0.375	41.000	0.500	30	28
44	44.000	43.250	0.375	43.000	0.500	32	30
46	46.000	45.250	0.375	45.000	0.500	33 1/2	31 1/2
48	48.000	47.250	0.375	47.000	0.500	35	33

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 124
- Asterisks (*) Denote Sch 40 and Sch 80

Wrought Steel Butt - Weld Fittings

Tees (Reducing)

STD (Sch 40), XS(Sch 80)



ASME B16.9

(in inches)

Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	STD(Sch 40)		XS(Sch 80)		Center to End	
			Large End T ₁	Small End T ₂	Large End T ₁	Small End T ₂	Run C	Outlet M
3/4 × 3/4 × 1/2	1.050	0.840	0.113	0.109	0.154	0.147	1 1/8	1 1/8
1 × 1 × 3/4	1.315	1.050	0.133	0.113	0.179	0.154	1 1/2	1 1/2
1 × 1 × 1/2	1.315	0.840	0.133	0.109	0.179	0.147	1 1/2	1 1/2
1 1/4 × 1 1/4 × 1	1.660	1.315	0.140	0.133	0.191	0.179	1 1/8	1 1/8
1 1/4 × 1 1/4 × 3/4	1.660	1.050	0.140	0.113	0.191	0.154	1 1/8	1 1/8
1 1/2 × 1 1/2 × 1 1/4	1.900	1.660	0.145	0.140	0.200	0.191	2 1/4	2 1/4
1 1/2 × 1 1/2 × 1	1.900	1.315	0.145	0.133	0.200	0.179	2 1/4	2 1/4
1 1/2 × 1 1/2 × 3/4	1.900	1.050	0.145	0.113	0.200	0.154	2 1/4	2 1/4
2 × 2 × 1 1/2	2.375	1.900	0.154	0.145	0.218	0.200	2 1/2	2 3/8
2 × 2 × 1 1/4	2.375	1.660	0.154	0.140	0.218	0.191	2 1/2	2 1/4
2 × 2 × 1	2.375	1.315	0.154	0.133	0.218	0.179	2 1/2	2
2 1/2 × 2 1/2 × 2	2.875	2.375	0.203	0.154	0.276	0.218	3	2 3/4
2 1/2 × 2 1/2 × 1 1/2	2.875	1.900	0.203	0.145	0.276	0.200	3	2 5/8
2 1/2 × 2 1/2 × 1 1/4	2.875	1.660	0.203	0.140	0.276	0.191	3	2 1/2
3 × 3 × 2 1/2	3.500	2.875	0.216	0.203	0.300	0.276	3 3/8	3 1/4
3 × 3 × 2	3.500	2.375	0.216	0.154	0.300	0.218	3 3/8	3
3 × 3 × 1 1/2	3.500	1.900	0.216	0.145	0.300	0.200	3 3/8	2 7/8
3 1/2 × 3 1/2 × 3	4.000	3.500	0.226	0.216	0.318	0.300	3 3/4	3 5/8
3 1/2 × 3 1/2 × 2 1/2	4.000	2.875	0.226	0.203	0.318	0.276	3 3/4	3 1/2
3 1/2 × 3 1/2 × 2	4.000	2.375	0.226	0.154	0.318	0.218	3 3/4	3 1/4
3 1/2 × 3 1/2 × 1 1/2	4.000	1.900	0.226	0.145	0.318	0.200	3 3/4	3 1/8
4 × 4 × 3 1/2	4.500	4.000	0.237	0.226	0.337	0.318	4 1/8	4
4 × 4 × 3	4.500	3.500	0.237	0.216	0.337	0.300	4 1/8	3 7/8
4 × 4 × 2 1/2	4.500	2.875	0.237	0.203	0.337	0.276	4 1/8	3 3/4
4 × 4 × 2	4.500	2.375	0.237	0.154	0.337	0.218	4 1/8	3 1/2
5 × 5 × 4	5.563	4.500	0.258	0.237	0.375	0.337	4 1/8	4 5/8
5 × 5 × 3 1/2	5.563	4.000	0.258	0.226	0.375	0.318	4 1/8	4 1/2
5 × 5 × 3	5.563	3.500	0.258	0.216	0.375	0.300	4 1/8	4 3/8
5 × 5 × 2 1/2	5.563	2.875	0.258	0.203	0.375	0.276	4 1/8	4 1/4
6 × 6 × 5	6.625	5.563	0.280	0.258	0.432	0.375	5 5/8	5 3/8
6 × 6 × 4	6.625	4.500	0.280	0.237	0.432	0.337	5 5/8	5 1/8
6 × 6 × 3 1/2	6.625	4.000	0.280	0.226	0.432	0.318	5 5/8	5
6 × 6 × 3	6.625	3.500	0.280	0.216	0.432	0.300	5 5/8	4 7/8
8 × 8 × 6	8.625	6.625	0.322	0.280	0.500	0.432	7	6 5/8
8 × 8 × 5	8.625	5.563	0.322	0.258	0.500	0.375	7	6 3/8
8 × 8 × 4	8.625	4.500	0.322	0.237	0.500	0.337	7	6 1/8
10 × 10 × 8	10.750	8.625	0.365	0.322	0.500	0.500	8 1/2	8
10 × 10 × 6	10.750	6.625	0.365	0.280	0.500	0.432	8 1/2	7 5/8
10 × 10 × 5	10.750	5.563	0.365	0.258	0.500	0.375	8 1/2	7 1/2
*10 × 10 × 8	10.750	8.625	—	—	0.594	0.500	8 1/2	8
*10 × 10 × 6	10.750	6.625	—	—	0.594	0.432	8 1/2	7 5/8
*10 × 10 × 5	10.750	5.563	—	—	0.594	0.375	8 1/2	7 1/2

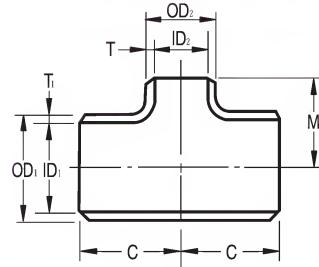
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 124
- Asterisks(*) Denote Sch 40 and Sch 80

Wrought Steel Butt - Weld Fittings



Tees (Reducing)

STD (Sch 40), XS(Sch 80)



ASME B16.9

(in inches)

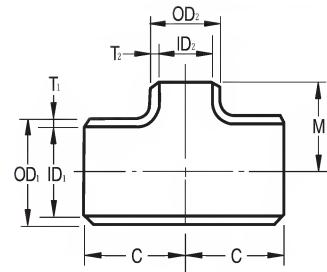
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	STD(Sch 40)		XS(Sch 80)		Center to End	
			Large End T ₁	Small End T ₂	Large End T ₁	Small End T ₂	Run C	Outlet M
12 × 12 × 10	12.750	10.750	0.375	0.365	0.500	0.500	10	9½
12 × 12 × 8	12.750	8.625	0.375	0.322	0.500	0.500	10	9
12 × 12 × 6	12.750	6.625	0.375	0.280	0.500	0.432	10	8½
*12 × 12 × 10	12.750	10.750	0.406	0.365	0.688	0.594	10	9½
*12 × 12 × 8	12.750	8.625	0.406	0.322	0.688	0.500	10	9
*12 × 12 × 6	12.750	6.625	0.406	0.280	0.688	0.432	10	8½
14 × 14 × 12	14.000	12.750	0.375	0.375	0.500	0.500	11	10½
14 × 14 × 10	14.000	10.750	0.375	0.365	0.500	0.500	11	10½
14 × 14 × 8	14.000	8.625	0.375	0.322	0.500	0.500	11	9¾
*14 × 14 × 12	14.000	12.750	0.438	0.406	0.750	0.688	11	10½
*14 × 14 × 10	14.000	10.750	0.438	0.365	0.750	0.594	11	10½
*14 × 14 × 8	14.000	8.625	0.438	0.322	0.750	0.500	11	9¾
16 × 16 × 14	16.000	14.000	0.375	0.375	0.500	0.500	12	12
16 × 16 × 12	16.000	12.750	0.375	0.375	0.500	0.500	12	11½
16 × 16 × 10	16.000	10.750	0.375	0.365	0.500	0.500	12	11½
*16 × 16 × 14	16.000	14.000	0.500	0.438	0.844	0.750	12	12
*16 × 16 × 12	16.000	12.750	0.500	0.406	0.844	0.688	12	11½
*16 × 16 × 10	16.000	10.750	0.500	0.365	0.844	0.594	12	11½
18 × 18 × 16	18.000	16.000	0.375	0.375	0.500	0.500	13½	13
18 × 18 × 14	18.000	14.000	0.375	0.375	0.500	0.500	13½	13
18 × 18 × 12	18.000	12.750	0.375	0.375	0.500	0.500	13½	12½
*18 × 18 × 16	18.000	16.000	0.562	0.500	0.938	0.844	13½	13
*18 × 18 × 14	18.000	14.000	0.562	0.438	0.938	0.750	13½	13
*18 × 18 × 12	18.000	12.750	0.562	0.406	0.938	0.688	13½	12½
20 × 20 × 18	20.000	18.000	0.375	0.375	0.500	0.500	15	14½
20 × 20 × 16	20.000	16.000	0.375	0.375	0.500	0.500	15	14
20 × 20 × 14	20.000	14.000	0.375	0.375	0.500	0.500	15	14
*20 × 20 × 18	20.000	18.000	0.594	0.562	1.031	0.938	15	14½
*20 × 20 × 16	20.000	16.000	0.594	0.500	1.031	0.844	15	14
*20 × 20 × 14	20.000	14.000	0.594	0.438	1.031	0.750	15	14
22 × 22 × 20	22.000	20.000	0.375	0.375	0.500	0.500	16½	16
22 × 22 × 18	22.000	18.000	0.375	0.375	0.500	0.500	16½	15½
22 × 22 × 16	22.000	16.000	0.375	0.375	0.500	0.500	16½	15
*22 × 22 × 20	22.000	20.000	—	—	1.125	1.031	16½	16
*22 × 22 × 18	22.000	18.000	—	—	1.125	0.938	16½	15½
*22 × 22 × 16	22.000	16.000	—	—	1.125	0.844	16½	15
24 × 24 × 22	24.000	22.000	0.375	0.375	0.500	0.500	17	17
24 × 24 × 20	24.000	20.000	0.375	0.375	0.500	0.500	17	17
24 × 24 × 18	24.000	18.000	0.375	0.375	0.500	0.500	17	16½
*24 × 24 × 22	24.000	22.000	—	—	1.219	1.125	17	17
*24 × 24 × 20	24.000	20.000	0.688	0.594	1.219	1.031	17	17
*24 × 24 × 18	24.000	18.000	0.688	0.562	1.219	0.938	17	16½

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 124
- Asterisks (*) Denote Sch 40 and Sch 80

Wrought Steel Butt - Weld Fittings

Tees (Reducing)

STD (Sch 40), XS(Sch 80)



ASME B16.9

(in inches)

Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	STD(Sch 40)		XS(Sch 80)		Center to End	
			Large End T ₁	Small End T ₂	Large End T ₁	Small End T ₂	Run C	Outlet M
26×26×22	26.000	22.000	0.375	0.375	0.500	0.500	19½	18½
26×26×18	26.000	18.000	0.375	0.375	0.500	0.500	19½	17½
26×26×16	26.000	16.000	0.375	0.375	0.500	0.500	19½	17
28×28×24	28.000	24.000	0.375	0.375	0.500	0.500	20½	20
28×28×20	28.000	20.000	0.375	0.375	0.500	0.500	20½	19
28×28×18	28.000	18.000	0.375	0.375	0.500	0.500	20½	18½
30×30×26	30.000	26.000	0.375	0.375	0.500	0.500	22	21½
30×30×22	30.000	22.000	0.375	0.375	0.500	0.500	22	20½
30×30×20	30.000	20.000	0.375	0.375	0.500	0.500	22	20
32×32×28	32.000	28.000	0.375	0.375	0.500	0.500	23½	22½
32×32×24	32.000	24.000	0.375	0.375	0.500	0.500	23½	22
32×32×22	32.000	22.000	0.375	0.375	0.500	0.500	23½	21½
*32×32×24	32.000	24.000	0.688	0.688	—	—	23½	22
34×34×30	34.000	30.000	0.375	0.375	0.500	0.500	25	24
34×34×26	34.000	26.000	0.375	0.375	0.500	0.500	25	23½
34×34×22	34.000	22.000	0.375	0.375	0.500	0.500	25	22½
36×36×32	36.000	32.000	0.375	0.375	0.500	0.500	26½	25½
36×36×28	36.000	28.000	0.375	0.375	0.500	0.500	26½	24½
36×36×24	36.000	24.000	0.375	0.375	0.500	0.500	26½	24
*36×36×32	36.000	32.000	0.750	0.688	—	—	26½	25½
*36×36×24	36.000	24.000	0.750	0.688	—	—	26½	24
38×38×34	38.000	34.000	0.375	0.375	0.500	0.500	28	27½
38×38×30	38.000	30.000	0.375	0.375	0.500	0.500	28	26½
38×38×26	38.000	26.000	0.375	0.375	0.500	0.500	28	25½
40×40×36	40.000	36.000	0.375	0.375	0.500	0.500	29½	29
40×40×32	40.000	32.000	0.375	0.375	0.500	0.500	29½	28
40×40×28	40.000	28.000	0.375	0.375	0.500	0.500	29½	26½
42×42×38	42.000	38.000	0.375	0.375	0.500	0.500	30	28
42×42×34	42.000	34.000	0.375	0.375	0.500	0.500	30	28
42×42×30	42.000	30.000	0.375	0.375	0.500	0.500	30	28
44×44×40	44.000	40.000	0.375	0.375	0.500	0.500	32	29½
44×44×36	44.000	36.000	0.375	0.375	0.500	0.500	32	28½
44×44×32	44.000	32.000	0.375	0.375	0.500	0.500	32	28
46×46×42	46.000	42.000	0.375	0.375	0.500	0.500	33½	31
46×46×38	46.000	38.000	0.375	0.375	0.500	0.500	33½	30
46×46×34	46.000	34.000	0.375	0.375	0.500	0.500	33½	29½
48×48×44	48.000	44.000	0.375	0.375	0.500	0.500	35	33
48×48×40	48.000	40.000	0.375	0.375	0.500	0.500	35	32
48×48×36	48.000	36.000	0.375	0.375	0.500	0.500	35	31

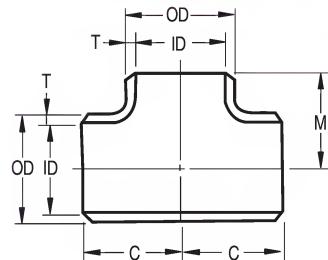
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 124
- Asterisks(*) Denote Sch 40 and Sch 80

Wrought Steel Butt - Weld Fittings



Tees (Straight)

Sch20,60,100,120,160, XXS



ASME B16.9

(in inches)

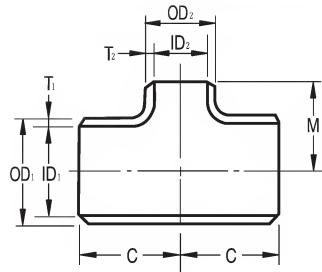
Nominal Pipe Size	Outside Diameter OD	Wall Thickness T						Center to End	
		Sch 20	Sch 60	Sch 100	Sch 120	Sch 160	XXS	Run C	Outlet M
1/2	0.840	—	—	—	—	0.188	0.294	1	1
5/8	1.050	—	—	—	—	0.219	0.308	1 1/8	1 1/8
1	1.315	—	—	—	—	0.250	0.358	1 1/2	1 1/2
1 1/4	1.660	—	—	—	—	0.250	0.382	1 7/8	1 7/8
1 1/2	1.900	—	—	—	—	0.281	0.400	2 1/4	2 1/4
2	2.375	—	—	—	—	0.344	0.436	2 1/2	2 1/2
2 1/2	2.875	—	—	—	—	0.375	0.552	3	3
3	3.500	—	—	—	—	0.438	0.600	3 3/8	3 3/8
4	4.500	—	—	—	0.438	0.531	0.674	4 1/8	4 1/8
5	5.563	—	—	—	0.500	0.625	0.750	4 7/8	4 7/8
6	6.625	—	—	—	0.562	0.719	0.864	5 5/8	5 5/8
8	8.625	0.250	0.406	0.594	0.719	0.906	0.875	7	7
10	10.750	0.250	0.500	0.719	0.844	1.125	1.000	8 1/2	8 1/2
12	12.750	0.250	0.562	0.844	1.000	1.132	1.000	10	10
14	14.000	0.312	0.594	0.938	1.094	1.406		11	11
16	16.000	0.312	0.656	1.031	1.219	1.594		12	12
18	18.000	0.312	0.750	1.156	1.375	1.781		13 1/2	13 1/2
20	20.000	0.375	0.812	1.281	1.500	1.969		15	15
22	22.000	0.375	0.875	1.375	1.625	2.125		16 1/2	16 1/2
24	24.000	0.375	0.969	1.531	1.812	2.344		17	17

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 124
- Wall Thickness Conform to ASME B 36.10M Specifications

Wrought Steel Butt - Weld Fittings

Tees (Reducing)

Sch 120, 160, XXS



ASME B16.9

(in inches)

Nominal Pipe Size	Outside Diameter OD ₁ , OD ₂	Wall Thickness T ₁ , T ₂			Center to End	
		Sch 120	Sch 160	XXS	Run C	Outlet M
3/4 × 3/4 × 1/2	1.050 0.840	—	0.219 0.188	0.308 0.294	1 1/8	1 1/8
1 × 1 × 3/4	1.315 1.050	—	0.250 0.219	0.358 0.308	1 1/2	1 1/2
1 × 1 × 1/2	1.315 0.840	—	0.250 0.188	0.358 0.294	1 1/2	1 1/2
1 1/4 × 1 1/4 × 1	1.660 1.315	—	0.250 0.250	0.382 0.358	1 7/8	1 7/8
1 1/4 × 1 1/4 × 3/4	1.660 1.050	—	0.250 0.219	0.382 0.308	1 7/8	1 7/8
1 1/2 × 1 1/2 × 1 1/4	1.900 1.660	—	0.281 0.250	0.400 0.382	2 1/4	2 1/4
1 1/2 × 1 1/2 × 1	1.900 1.315	—	0.281 0.250	0.400 0.358	2 1/4	2 1/4
1 1/2 × 1 1/2 × 3/4	1.900 1.050	—	0.281 0.219	0.400 0.308	2 1/4	2 1/4
2 × 2 × 1 1/2	2.375 1.900	—	0.344 0.281	0.436 0.400	2 1/2	2 3/8
2 × 2 × 1 1/4	2.375 1.660	—	0.344 0.250	0.436 0.382	2 1/2	2 1/4
2 × 2 × 1	2.375 1.315	—	0.344 0.250	0.436 0.358	2 1/2	2
2 1/2 × 2 1/2 × 2	2.875 2.375	—	0.375 0.344	0.552 0.436	3	2 3/4
2 1/2 × 2 1/2 × 1 1/2	2.875 1.900	—	0.375 0.281	0.552 0.400	3	2 5/8
3 × 3 × 2 1/2	3.500 2.875	—	0.438 0.375	0.600 0.552	3 3/8	3 1/4
3 × 3 × 2	3.500 2.375	—	0.438 0.344	0.600 0.436	3 3/8	3
4 × 4 × 3	4.500 3.500	—	0.531 0.438	0.674 0.600	4 1/8	3 7/8
4 × 4 × 2 1/2	4.500 2.875	—	0.531 0.375	0.674 0.552	4 1/8	3 3/4
4 × 4 × 2	4.500 2.375	—	0.531 0.344	0.674 0.436	4 1/8	3 1/2
5 × 5 × 4	5.563 4.500	0.500 0.438	0.625 0.531	0.750 0.674	4 1/8	4 5/8
5 × 5 × 3	5.563 3.500	—	0.625 0.438	0.750 0.600	4 1/8	4 3/8
5 × 5 × 2 1/2	5.563 2.875	—	0.625 0.375	0.750 0.552	4 1/8	4 1/4
6 × 6 × 5	6.625 5.563	0.562 0.500	0.719 0.625	0.864 0.750	5 5/8	5 3/8
6 × 6 × 4	6.625 4.500	0.562 0.438	0.719 0.531	0.864 0.674	5 5/8	5 1/8
6 × 6 × 3	6.625 3.500	—	0.719 0.438	0.864 0.600	5 5/8	4 7/8
8 × 8 × 6	8.625 6.625	0.719 0.562	0.906 0.719	0.875 0.864	7	6 5/8
8 × 8 × 5	8.625 5.563	0.719 0.500	0.926 0.625	0.875 0.750	7	6 3/8
8 × 8 × 4	8.625 4.500	0.719 0.438	0.906 0.531	0.875 0.674	7	6 1/8

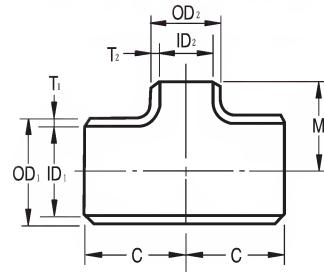
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 124
- Wall Thickness Conform to ASME B 36.10M Specifications

Wrought Steel Butt - Weld Fittings



Tees (Reducing)

Sch 20, 60, 100, 120, 140, 160, XXS



ASME B16.9

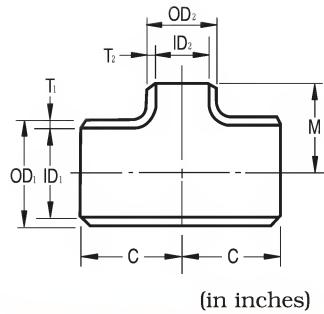
(in inches)

Nominal Pipe Size	Outside Diameter OD ₁ , OD ₂	Wall Thickness T ₁ , T ₂						Center to End	
		Sch 20	Sch 60	Sch 100	Sch 120	Sch 140	Sch 160	XXS	Run C
10×10×8	10.750 8.625	0.250 0.250	0.500 0.406	0.719 0.594	0.844 0.719	1.000 0.812	1.125 0.906	1.000 0.875	8½ 8
10×10×6	10.750 6.625	—	—	—	0.562	—	1.125 0.719	1.000 0.864	8½ 7½
10×10×5	10.750 5.563	—	—	—	0.844 0.500	—	1.125 0.625	1.000 0.750	8½ 7½
12×12×10	12.750 10.750	0.250 0.250	0.562 0.500	0.844 0.719	1.000 0.844	1.125 1.000	1.312 1.125	1.000 1.000	10 9½
12×12×8	12.750 8.625	0.250 0.250	0.562 0.406	0.844 0.594	1.000 0.719	1.125 0.812	1.312 0.906	1.000 0.875	10 9
12×12×6	12.750 6.625	—	—	—	1.000 0.562	—	1.312 0.719	1.000 0.864	10 8½
14×14×12	14.000 12.750	0.312 0.250	0.594 0.562	0.938 0.844	1.094 1.000	1.250 1.125	1.406 1.312	—	11 10½
14×14×10	14.000 10.750	0.312 0.250	0.594 0.500	0.938 0.719	1.094 0.844	1.125 1.000	1.406 1.125	—	11 10½
14×14×8	14.000 8.625	0.312 0.250	0.594 0.406	0.938 0.594	1.094 0.719	1.250 0.812	1.406 0.906	—	11 9¾
16×16×14	16.000 14.000	0.312 0.312	0.656 0.594	1.031 0.938	1.219 1.094	1.438 1.250	1.594 1.406	—	12 12
16×16×12	16.000 12.750	0.312 0.250	0.656 0.562	1.031 0.844	1.219 1.000	1.438 1.125	1.594 1.312	—	12 11½
16×16×10	16.000 10.750	0.312 0.250	0.656 0.500	1.031 0.719	1.219 0.844	1.438 1.000	1.594 1.125	—	12 11½
18×18×16	18.000 16.000	0.312 0.312	0.750 0.656	1.156 1.031	1.375 1.219	1.562 1.438	1.781 1.574	—	13½ 13
18×18×14	18.000 14.000	0.312 0.312	0.750 0.594	1.156 0.938	1.375 1.094	1.562 1.250	1.781 1.406	—	13½ 13
18×18×12	18.000 12.750	0.312 0.250	0.750 0.562	1.156 0.844	1.375 1.000	1.562 1.125	1.781 1.312	—	13½ 12½
20×20×18	20.000 18.000	0.375 0.312	0.812 0.750	1.281 1.156	1.500 1.375	1.750 1.562	1.969 1.781	—	15 14½
20×20×16	20.000 16.000	0.375 0.312	0.812 0.656	1.281 1.031	1.500 1.219	1.750 1.438	1.969 1.594	—	15 14
20×20×14	20.000 14.000	0.375 0.312	0.812 0.594	1.281 0.938	1.500 1.094	1.750 1.250	1.769 1.406	—	15 14
22×22×20	22.000 20.000	0.375 0.375	0.875 0.812	1.375 1.281	1.625 1.500	1.875 1.750	2.125 1.969	—	16½ 16
22×22×18	22.000 18.000	0.375 0.312	0.875 0.750	1.375 1.156	1.625 1.375	1.875 1.562	2.125 1.781	—	16½ 15½
22×22×16	22.000 16.000	0.375 0.312	0.875 0.656	1.375 1.031	1.625 1.219	1.875 1.438	2.125 1.594	—	16½ 15
24×24×22	24.000 22.000	0.375 0.375	0.969 0.875	1.531 1.375	1.812 1.625	2.062 1.875	2.344 2.125	—	17 17
24×24×20	24.000 20.000	0.375 0.375	0.969 0.812	1.531 1.281	1.812 1.500	2.062 1.750	2.344 1.969	—	17 17
24×24×18	24.000 18.000	0.375 0.312	0.969 0.750	1.531 1.156	1.812 1.375	2.062 1.562	2.344 1.781	—	17 16½

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 124
- Wall Thickness Conform to ASME B 36.10M Specifications

Wrought Steel Butt - Weld Fittings

Tees



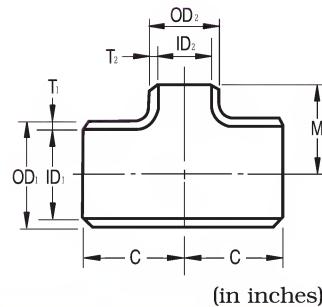
(in inches)

NPS		TEE			
		OD1	OD2	C	M
50	50	50.00	50.00	36.50	34.50
50	48	50.00	48.00	36.50	33.00
50	46	50.00	46.00	36.50	32.00
50	44	50.00	44.00	36.50	31.00
50	42	50.00	42.00	36.50	30.00
50	40	50.00	40.00	36.50	29.00
50	38	50.00	38.00	36.50	29.00
52	52	52.00	52.00	38.00	36.00
52	50	52.00	50.00	38.00	35.00
52	48	52.00	48.00	38.00	34.00
52	46	52.00	46.00	38.00	33.00
52	44	52.00	44.00	38.00	32.00
52	42	52.00	42.00	38.00	31.00
52	40	52.00	40.00	38.00	30.00
52	38	52.00	38.00	38.00	30.00
54	54	54.00	54.00	39.50	37.50
54	52	54.00	52.00	39.50	36.00
54	50	54.00	50.00	39.50	35.00
54	48	54.00	48.00	39.50	34.00
54	46	54.00	46.00	39.50	33.00
54	44	54.00	44.00	39.50	32.00
54	40	54.00	40.00	39.50	31.00
54	28	54.00	28.00	39.50	31.00
54	20	54.00	20.00	39.50	31.00
56	56	56.00	56.00	41.00	38.00
56	54	56.00	54.00	41.00	37.00
56	52	56.00	52.00	41.00	36.00
56	50	56.00	50.00	41.00	35.00
56	48	56.00	48.00	41.00	34.00
56	46	56.00	46.00	41.00	33.00
56	44	56.00	44.00	41.00	32.00
56	40	56.00	40.00	41.00	32.00
56	28	56.00	28.00	41.00	32.00
56	20	56.00	20.00	41.00	32.00
58	58	58.00	58.00	42.50	39.00
58	56	58.00	56.00	42.50	38.00
58	54	58.00	54.00	42.50	37.00
58	52	58.00	52.00	42.50	36.00
58	50	58.00	50.00	42.50	35.00
58	48	58.00	48.00	42.50	34.00
58	46	58.00	46.00	42.50	33.00
58	44	58.00	44.00	42.50	33.00
60	60	60.00	60.00	44.00	40.00
60	58	60.00	58.00	44.00	39.00
60	56	60.00	56.00	44.00	38.00
60	54	60.00	54.00	44.00	37.00
60	52	60.00	52.00	44.00	36.00
60	50	60.00	50.00	44.00	35.00

Wrought Steel Butt - Weld Fittings



Tees

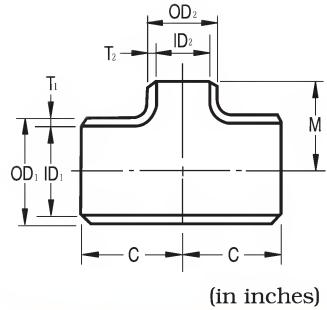


(in inches)

NPS		TEE			
		OD1	OD2	C	M
60	48	60.00	48.00	44.00	34.00
60	46	60.00	46.00	44.00	34.00
60	40	60.00	40.00	44.00	34.00
60	28	60.00	28.00	44.00	34.00
60	20	60.00	20.00	44.00	34.00
62	62	62.00	62.00	45.00	40.50
62	60	62.00	60.00	45.00	39.00
62	58	62.00	58.00	45.00	38.00
62	56	62.00	56.00	45.00	37.00
62	54	62.00	54.00	45.00	36.00
62	52	62.00	52.00	45.00	35.00
62	50	62.00	50.00	45.00	35.00
64	64	64.00	64.00	46.00	41.00
64	62	64.00	62.00	46.00	40.00
64	60	64.00	60.00	46.00	39.00
64	58	64.00	58.00	46.00	38.00
64	56	64.00	56.00	46.00	37.00
64	54	64.00	54.00	46.00	36.00
64	52	64.00	52.00	46.00	36.00
66	66	66.00	66.00	48.00	42.00
66	64	66.00	64.00	48.00	41.00
66	62	66.00	62.00	48.00	40.00
66	60	66.00	60.00	48.00	39.00
66	58	66.00	58.00	48.00	38.00
66	56	66.00	56.00	48.00	37.00
66	54	66.00	54.00	48.00	37.00
68	68	68.00	68.00	49.00	43.00
68	66	68.00	66.00	49.00	42.00
68	64	68.00	64.00	49.00	41.00
68	62	68.00	62.00	49.00	40.00
68	60	68.00	60.00	49.00	39.00
68	58	68.00	58.00	49.00	38.00
68	56	68.00	56.00	49.00	38.00
70	70	70.00	70.00	50.00	44.00
70	68	70.00	68.00	50.00	43.00
70	66	70.00	66.00	50.00	42.00
70	64	70.00	64.00	50.00	41.00
70	62	70.00	62.00	50.00	40.00
70	60	70.00	60.00	50.00	39.00
70	58	70.00	58.00	50.00	39.00
72	72	72.00	72.00	52.00	45.00
72	70	72.00	70.00	52.00	44.00
72	68	72.00	68.00	52.00	43.00
72	66	72.00	66.00	52.00	42.00
72	64	72.00	64.00	52.00	41.00
72	62	72.00	62.00	52.00	40.00
72	60	72.00	60.00	52.00	40.00
74	74	74.00	74.00	53.00	46.00
74	72	74.00	72.00	53.00	45.00
74	70	74.00	70.00	53.00	44.00
74	68	74.00	68.00	53.00	43.00

Wrought Steel Butt - Weld Fittings

Tees



(in inches)

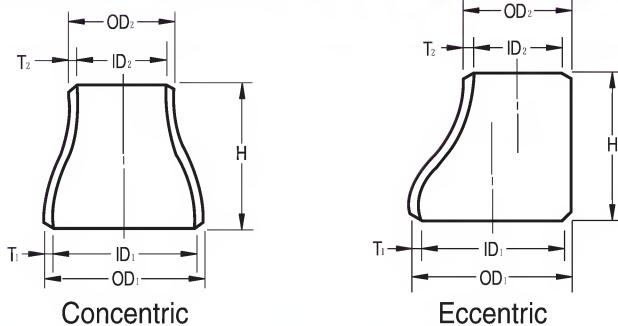
NPS		TEE			
		OD1	OD2	C	M
74	66	74.00	66.00	53.00	42.00
74	64	74.00	64.00	53.00	41.00
74	62	74.00	62.00	53.00	41.00
76	76	76.00	76.00	54.00	47.00
76	74	76.00	74.00	54.00	46.00
76	72	76.00	72.00	54.00	45.00
76	70	76.00	70.00	54.00	44.00
76	68	76.00	68.00	54.00	43.00
76	66	76.00	66.00	54.00	42.00
76	64	76.00	64.00	54.00	42.00
78	78	78.00	78.00	55.00	48.00
78	76	78.00	76.00	55.00	47.00
78	74	78.00	74.00	55.00	46.00
78	72	78.00	72.00	55.00	45.00
78	70	78.00	70.00	55.00	44.00
78	68	78.00	68.00	55.00	43.00
78	66	78.00	66.00	55.00	43.00
80	80	80.00	80.00	56.00	49.00
80	78	80.00	78.00	56.00	48.00
80	76	80.00	76.00	56.00	47.00
80	74	80.00	74.00	56.00	46.00
80	72	80.00	72.00	56.00	45.00
80	70	80.00	70.00	56.00	44.00
80	68	80.00	68.00	56.00	44.00
82	82	82.00	82.00	57.00	50.00
82	80	82.00	80.00	57.00	49.00
82	78	82.00	78.00	57.00	48.00
82	76	82.00	76.00	57.00	47.00
82	74	82.00	74.00	57.00	46.00
82	72	82.00	72.00	57.00	45.00
82	70	82.00	70.00	57.00	45.00
84	84	84.00	84.00	58.00	51.00

Wrought Steel Butt - Weld Fittings



Reducers

STD (Sch 40), XS(Sch 80)



(in inches)

ASME B16.9

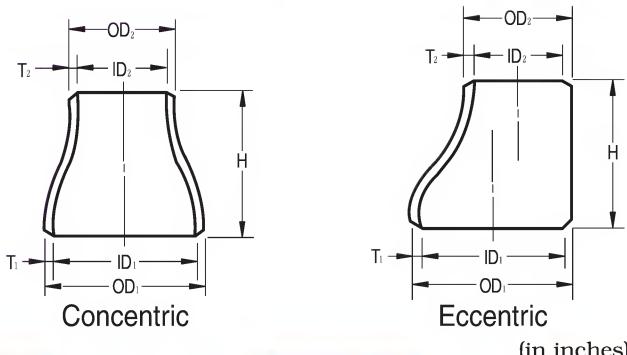
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	STD(Sch 40)				XS(Sch 80)				End to End H	
			Large End		Small End		Large End		Small End			
			ID ₁	T ₁	ID ₂	T ₂	ID ₁	T ₁	ID ₂	T ₂		
3/4 × 1/2	1.050	0.840	0.824	0.113	0.622	0.109	0.742	0.514	0.546	0.147	1 1/2	
1 ×	1.315	1.050	1.049	0.133	0.824	0.113	0.957	0.179	0.742	0.154	2	
1 ×	1.315	0.840	1.049	0.133	0.622	0.109	0.957	0.179	0.546	0.147	2	
1 1/4 × 1	1.660	1.315	1.380	0.140	1.049	0.133	1.278	0.191	0.957	0.179	2	
1 1/4 × 3/4	1.660	1.050	1.380	0.140	0.824	0.113	1.278	0.191	0.742	0.154	2	
1 1/4 × 1/2	1.660	0.840	1.380	0.140	0.622	0.109	1.278	0.191	0.546	0.147	2	
1 1/2 × 1 1/4	1.900	1.660	1.610	0.145	1.380	0.140	1.500	0.200	1.278	0.191	2 1/2	
1 1/2 × 1	1.900	1.315	1.610	0.145	1.049	0.133	1.500	0.200	0.957	0.179	2 1/2	
1 1/2 × 3/4	1.900	1.050	1.610	0.145	0.824	0.113	1.500	0.200	0.742	0.154	2 1/2	
2 × 1 1/2	2.375	1.900	2.067	0.154	1.610	0.145	1.939	0.218	1.500	0.200	3	
2 × 1 1/4	2.375	1.660	2.067	0.154	1.380	0.140	1.939	0.218	1.278	0.191	3	
2 × 1	2.375	1.315	2.067	0.154	1.049	0.133	1.939	0.218	0.957	0.179	3	
2 × 3/4	2.375	1.050	2.067	0.154	0.824	0.113	1.939	0.218	0.742	0.154	3	
2 1/2 × 2	2.875	2.375	2.469	0.203	2.067	0.154	2.323	0.276	1.939	0.218	3 1/2	
2 1/2 × 1 1/2	2.875	1.900	2.469	0.203	1.610	0.145	2.323	0.276	1.500	0.200	3 1/2	
2 1/2 × 1 1/4	2.875	1.660	2.469	0.203	1.380	0.140	2.323	0.276	1.278	0.191	3 1/2	
2 1/2 × 1	2.875	1.315	2.469	0.203	1.049	0.133	2.323	0.276	0.957	0.179	3 1/2	
3 × 2 1/2	3.500	2.875	3.068	0.216	2.469	0.203	2.900	0.300	2.323	0.276	3 1/2	
3 × 2	3.500	2.375	3.068	0.216	2.067	0.154	2.900	0.300	1.939	0.218	3 1/2	
3 × 1 1/2	3.500	1.900	3.068	0.216	1.610	0.145	2.900	0.300	1.500	0.200	3 1/2	
3 × 1 1/4	3.500	1.660	3.068	0.216	1.380	0.140	2.900	0.300	1.278	0.191	3 1/2	
3 1/2 × 3	4.000	3.500	3.548	0.226	0.368	0.216	3.364	0.318	2.900	0.300	4	
3 1/2 × 2 1/2	4.000	2.875	3.548	0.226	2.469	0.203	3.364	0.318	2.323	0.276	4	
3 1/2 × 2	4.000	2.375	3.548	0.226	2.067	0.154	3.364	0.318	1.939	0.218	4	
3 1/2 × 1 1/2	4.000	1.900	3.548	0.226	1.610	0.145	3.364	0.318	1.500	0.200	4	
4 × 3 1/2	4.500	4.000	4.026	0.237	3.548	0.226	3.826	0.337	3.364	0.318	4	
4 × 3	4.500	3.500	4.026	0.237	3.068	0.216	3.826	0.337	2.900	0.300	4	
4 × 2 1/2	4.500	2.875	4.026	0.237	2.469	0.203	3.826	0.337	2.323	0.276	4	
4 × 2	4.500	2.375	4.026	0.237	2.607	0.154	3.826	0.337	1.939	0.218	4	
5 × 4	5.563	4.500	5.047	0.258	4.026	0.237	4.813	0.375	3.826	0.337	5	
5 × 3 1/2	5.563	4.000	5.047	0.258	3.548	0.226	4.813	0.375	3.364	0.318	5	
5 × 3	5.563	3.500	5.047	0.258	3.068	0.216	4.813	0.375	2.900	0.300	5	
5 × 2 1/2	5.563	2.875	5.047	0.258	2.469	0.203	4.813	0.375	2.323	0.276	5	
6 × 5	6.625	5.563	6.065	0.280	5.047	0.258	5.761	0.432	4.813	0.375	5 1/2	
6 × 4	6.625	4.500	6.065	0.280	4.026	0.237	5.761	0.432	3.826	0.337	5 1/2	
6 × 3 1/2	6.625	4.000	6.065	0.280	3.548	0.226	5.761	0.432	3.364	0.318	5 1/2	
6 × 3	6.625	3.500	6.065	0.280	3.068	0.216	5.761	0.432	2.900	0.300	5 1/2	
6 × 2 1/2	6.625	2.875	6.065	0.280	2.469	0.203	5.761	0.432	2.323	0.276	5 1/2	
8 × 6	8.625	6.625	7.981	0.322	6.065	0.280	7.625	0.500	5.761	0.432	6	
8 × 5	8.625	5.563	7.981	0.322	5.047	0.258	7.625	0.500	4.813	0.375	6	
8 × 4	8.625	4.500	7.981	0.322	4.026	0.237	7.625	0.500	3.826	0.337	6	
8 × 3 1/2	8.625	4.000	7.981	0.322	3.548	0.226	7.625	0.500	3.364	0.318	6	
10 × 8	10.750	8.625	10.020	0.365	7.981	0.322	9.750	0.500	7.625	0.500	7	
10 × 6	10.750	6.625	10.020	0.365	6.065	0.280	9.750	0.500	5.761	0.432	7	
10 × 5	10.750	5.563	10.020	0.365	5.047	0.258	9.750	0.500	4.813	0.375	7	
10 × 4	10.750	4.500	10.020	0.365	4.026	0.237	9.750	0.500	3.826	0.337	7	
*10 × 8	10.750	8.625	—	—	—	—	9.562	0.594	7.625	0.500	7	
*10 × 6	10.750	6.626	—	—	—	—	9.562	0.594	5.761	0.432	7	
*10 × 5	10.750	5.563	—	—	—	—	9.562	0.594	4.813	0.375	7	
*10 × 4	10.750	4.500	—	—	—	—	9.562	0.594	3.826	0.337	7	

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 125
- Asterisks (*) Denote Sch 80

Wrought Steel Butt - Weld Fittings

Reducers

STD (Sch 40), XS(Sch 80)



ASME B16.9

Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	STD(Sch 40)				XS(Sch 80)				End to End H	
			Large End		Small End		Large End		Small End			
			ID ₁	T ₁	ID ₂	T ₂	ID ₁	T ₁	ID ₂	T ₂		
12×10	12.750	10.750	12.000	0.375	10.020	0.365	11.750	0.500	9.750	0.500	8	
12×8	12.750	8.625	12.000	0.375	7.981	0.322	11.750	0.500	7.625	0.500	8	
12×6	12.750	6.625	12.000	0.375	6.065	0.280	11.750	0.500	5.761	0.432	8	
12×5	12.750	5.563	12.000	0.375	5.047	0.258	11.750	0.500	4.813	0.375	8	
*12×10	12.750	10.750	11.938	0.406	10.020	0.365	11.374	0.688	9.562	0.594	8	
*12×8	12.750	8.625	11.938	0.406	7.981	0.322	11.374	0.688	7.625	0.500	8	
*12×8	12.750	6.625	11.938	0.406	6.065	0.280	11.374	0.688	5.761	0.432	8	
*12×5	12.750	5.563	11.938	0.406	5.047	0.258	11.374	0.688	4.813	0.375	8	
14×12	14.000	12.750	13.250	0.375	12.000	0.375	13.000	0.500	11.750	0.500	13	
14×10	14.000	10.750	13.250	0.375	10.020	0.365	13.000	0.500	9.750	0.500	13	
14×8	14.000	8.625	13.250	0.375	7.981	0.322	13.000	0.500	7.625	0.500	13	
*14×12	14.000	12.750	13.124	0.438	11.938	0.406	12.500	0.750	11.374	0.688	13	
*14×10	14.000	10.750	13.124	0.438	10.020	0.365	12.500	0.750	9.562	0.594	13	
*14×8	14.000	8.625	13.124	0.438	7.981	0.322	12.500	0.750	7.625	0.500	13	
16×14	16.000	14.000	15.250	0.375	13.250	0.375	15.000	0.500	13.000	0.500	14	
16×12	16.000	12.750	15.250	0.375	12.000	0.375	15.000	0.500	11.750	0.500	14	
16×10	16.000	10.750	15.250	0.375	10.020	0.365	15.000	0.500	9.750	0.500	14	
*16×14	16.000	14.000	15.000	0.500	13.124	0.438	14.312	0.844	12.500	0.750	14	
*16×12	16.000	12.750	15.000	0.500	11.938	0.406	14.312	0.844	11.374	0.688	14	
*16×10	16.000	10.750	15.000	0.500	10.020	0.365	14.312	0.844	9.562	0.594	14	
18×16	18.000	16.000	17.250	0.375	15.250	0.375	17.000	0.500	15.000	0.500	15	
18×14	18.000	14.000	17.250	0.375	13.250	0.375	17.000	0.500	13.000	0.500	15	
18×12	18.000	12.750	17.250	0.375	12.000	0.375	17.000	0.500	11.750	0.500	15	
*18×16	18.000	16.000	16.876	0.562	15.000	0.500	16.124	0.938	14.312	0.844	15	
*18×14	18.000	14.000	16.876	0.562	13.124	0.438	16.124	0.938	12.500	0.750	15	
*18×12	18.000	12.750	16.876	0.562	11.938	0.406	16.124	0.938	11.374	0.688	15	
20×18	20.000	18.000	19.250	0.375	17.250	0.375	19.000	0.500	17.000	0.500	20	
20×16	20.000	16.000	19.250	0.375	15.250	0.375	19.000	0.500	15.000	0.500	20	
20×14	20.000	14.000	19.250	0.375	13.250	0.375	19.000	0.500	13.000	0.500	20	
*20×18	20.000	18.000	18.812	0.562	16.876	0.562	17.938	1.031	16.124	0.938	20	
*20×16	20.000	16.000	18.812	0.562	15.000	0.500	17.938	1.031	14.312	0.844	20	
*20×14	20.000	14.000	18.812	0.562	13.124	0.438	17.938	1.031	12.500	0.750	20	
22×20	22.000	20.000	21.250	0.375	19.250	0.375	21.000	0.500	19.000	0.500	20	
22×18	22.000	18.000	21.250	0.375	17.250	0.375	21.000	0.500	17.000	0.500	20	
22×16	22.000	16.000	21.250	0.375	15.250	0.375	21.000	0.500	15.000	0.500	20	
*22×20	22.000	20.000	—	—	—	—	19.750	1.125	17.938	1.031	20	
*22×18	22.000	18.000	—	—	—	—	19.750	1.125	16.124	0.938	20	
*22×16	22.000	16.000	—	—	—	—	19.750	1.125	14.312	0.844	20	
24×22	24.000	22.000	23.250	0.375	21.250	0.375	23.000	0.500	21.000	0.500	20	
24×20	24.000	20.000	23.250	0.375	19.250	0.375	23.000	0.500	19.000	0.500	20	
24×18	24.000	18.000	23.250	0.375	17.250	0.375	23.000	0.500	17.000	0.500	20	
*24×22	24.000	22.000	—	—	—	—	21.562	1.129	19.750	1.125	20	
*24×20	24.000	20.000	22.624	0.688	18.812	0.594	21.562	1.219	17.938	1.031	20	
*24×18	24.000	18.000	22.624	0.688	16.876	0.562	21.562	1.219	16.124	0.938	20	
26×22	26.000	22.000	25.250	0.375	21.250	0.375	25.000	0.500	21.000	0.500	24	
26×18	26.000	18.000	25.250	0.375	17.250	0.375	25.000	0.500	17.000	0.500	24	
26×16	26.000	16.000	25.250	0.375	15.250	0.375	25.000	0.500	15.000	0.500	24	
28×24	28.000	24.000	27.250	0.375	23.250	0.375	27.000	0.500	23.000	0.500	24	
28×20	28.000	20.000	27.250	0.375	19.250	0.375	27.000	0.500	19.000	0.500	24	
28×18	28.000	18.000	27.250	0.375	17.250	0.375	27.000	0.500	17.000	0.500	24	

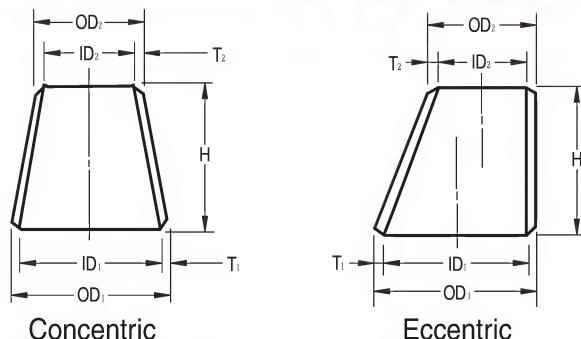
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 125
- Asterisks(*) Denote Sch 40 and Sch 80

Wrought Steel Butt - Weld Fittings



Reducers

STD (Sch 40), XS(Sch 80)



(in inches)

ASME B16.9

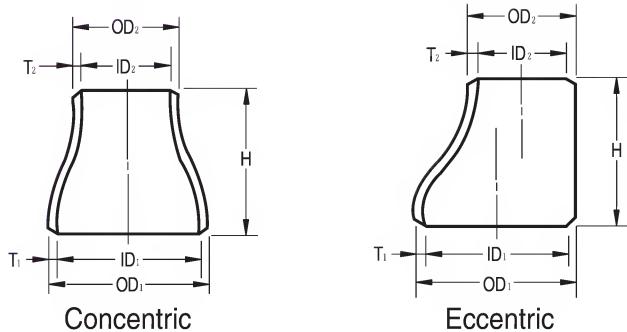
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	STD(Sch 40)				XS(Sch 80)				End to End H	
			Large End		Small End		Large End		Small End			
			ID ₁	T ₁	ID ₂	T ₂	ID ₁	T ₁	ID ₂	T ₂		
30×26	30.000	26.000	29.250	0.375	25.250	0.375	29.000	0.500	25.000	0.500	24	
30×22	30.000	22.000	29.250	0.375	21.250	0.375	29.000	0.500	21.000	0.500	24	
30×20	30.000	20.000	29.250	0.375	19.250	0.375	29.000	0.500	19.000	0.500	24	
32×28	32.000	28.000	31.250	0.375	27.250	0.375	31.000	0.500	27.000	0.500	24	
32×24	32.000	24.000	31.250	0.375	23.250	0.375	31.000	0.500	23.000	0.500	24	
32×22	32.000	22.000	31.250	0.375	21.250	0.375	31.000	0.500	21.000	0.500	24	
*32×24	32.000	24.000	30.624	0.688	22.264	0.688	—	—	—	—	24	
34×30	34.000	30.000	33.250	0.375	29.250	0.375	33.000	0.500	29.000	0.500	24	
34×26	34.000	26.000	33.250	0.375	25.250	0.375	33.000	0.500	25.000	0.500	24	
34×22	34.000	22.000	33.250	0.375	21.250	0.375	33.000	0.500	21.000	0.500	24	
36×32	36.000	32.000	35.250	0.375	31.250	0.375	35.000	0.500	31.000	0.500	24	
36×28	36.000	28.000	35.250	0.375	27.250	0.375	35.000	0.500	27.000	0.500	24	
36×24	36.000	24.000	35.250	0.375	23.250	0.375	35.000	0.500	23.000	0.500	24	
*36×32	36.000	32.000	34.500	0.750	30.624	0.688	—	—	—	—	24	
*36×24	36.000	24.000	34.500	0.750	22.264	0.688	—	—	—	—	24	
38×34	38.000	34.000	37.250	0.375	33.250	0.375	37.000	0.500	33.000	0.500	24	
38×30	38.000	30.000	37.250	0.375	29.250	0.375	37.000	0.500	29.000	0.500	24	
38×26	38.000	26.000	37.250	0.375	29.250	0.375	37.000	0.500	25.000	0.500	24	
40×36	40.000	36.000	39.250	0.375	35.250	0.375	39.000	0.500	35.000	0.500	24	
40×32	40.000	32.000	39.250	0.375	31.250	0.375	39.000	0.500	31.000	0.500	24	
40×28	40.000	28.000	39.250	0.375	27.250	0.375	39.000	0.500	27.000	0.500	24	
42×38	42.000	38.000	41.250	0.375	37.250	0.375	41.000	0.500	37.000	0.500	24	
42×34	42.000	34.000	41.250	0.375	33.250	0.375	41.000	0.500	33.000	0.500	24	
42×30	42.000	30.000	41.250	0.375	29.250	0.375	41.000	0.500	29.000	0.500	24	
44×40	44.000	40.000	43.250	0.375	39.250	0.375	43.000	0.500	39.000	0.500	24	
44×36	44.000	36.000	43.250	0.375	35.250	0.375	43.000	0.500	35.000	0.500	24	
44×32	44.000	32.000	43.250	0.375	31.250	0.375	43.000	0.500	31.000	0.500	24	
46×42	46.000	42.000	45.250	0.375	41.250	0.375	45.000	0.500	41.000	0.500	28	
46×38	46.000	38.000	45.250	0.375	37.250	0.375	45.000	0.500	37.000	0.500	28	
46×34	46.000	34.000	45.250	0.375	33.250	0.375	45.000	0.500	33.000	0.500	28	
48×44	48.000	44.000	47.250	0.375	43.250	0.375	47.000	0.500	43.000	0.500	28	
48×40	48.000	40.000	47.250	0.375	39.250	0.375	47.000	0.500	39.000	0.500	28	
48×36	48.000	36.000	47.250	0.375	35.250	0.375	47.000	0.500	37.000	0.500	28	

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 125
- Asterisks (*) Denote Sch 40

Wrought Steel Butt - Weld Fittings

Reducers

Sch 120, 160, XXS



ASME B16.9

(in inches)

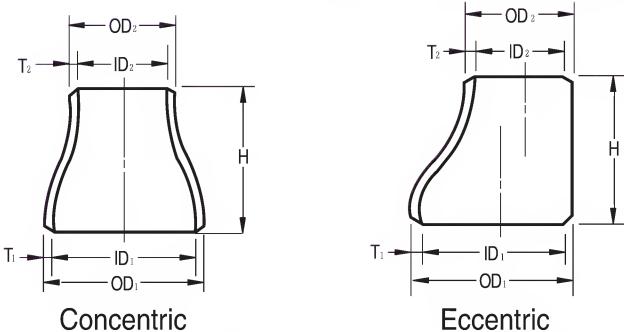
Nominal Pipe Size	Outside Diameter OD ₁ , OD ₂	Wall Thickness T ₁ , T ₂			End to End H
		Sch 120	Sch 160	XXS	
3/4 × 1/2	1.050 0.840	—	0.219 0.188	0.308 0.294	1 1/2
1 × 3/4	1.315 1.050	—	0.250 0.219	0.358 0.308	2
1 × 1/2	1.315 0.840	—	0.250 0.188	0.358 0.294	2
1 1/4 × 1	1.660 1.315	—	0.250 0.250	0.382 0.358	2
1 1/4 × 3/4	1.660 1.050	—	0.250 0.219	0.382 0.308	2
1 1/2 × 1 3/4	1.900 1.660	—	0.281 0.250	0.400 0.382	2 1/2
1 × 1 1/2	1.900 1.315	—	0.281 0.250	0.400 0.358	2 1/2
1 1/2 × 3/4	1.900 1.050	—	0.281 0.219	0.400 0.308	2 1/2
2 × 1 1/2	2.375 1.900	—	0.344 0.281	0.436 0.400	3
2 × 1 1/4	2.375 1.660	—	0.344 0.250	0.436 0.382	3
2 × 1	2.375 1.315	—	0.344 0.250	0.436 0.358	3
2 1/2 × 2	2.875 2.375	—	0.375 0.344	0.552 0.436	3 1/2
2 1/2 × 1 1/2	2.875 1.900	—	0.375 0.281	0.552 0.400	3 1/2
2 1/2 × 1 1/4	2.875 1.660	—	0.375 0.250	0.552 0.382	3 1/2
3 × 2 1/2	3.500 2.875	—	0.438 0.375	0.600 0.552	3 1/2
3 × 2	3.500 2.375	—	0.438 0.344	0.600 0.436	3 1/2
3 × 1 1/2	3.500 1.900	—	0.438 0.281	0.600 0.400	3 1/2
3 × 1 1/4	3.500 1.660	—	0.438 0.250	0.600 0.382	3 1/2
4 × 3	4.500 3.500	—	0.531 0.438	0.674 0.600	4
4 × 2 1/2	4.500 2.875	—	0.531 0.375	0.674 0.552	4
4 × 2	4.500 2.375	—	0.531 0.344	0.674 0.436	4
5 × 4	5.563 4.500	0.500 0.438	0.625 0.531	0.750 0.674	5
5 × 3	5.563 3.500	—	0.625 0.438	0.750 0.600	5
5 × 2 1/2	5.563 2.875	—	0.625 0.375	0.750 0.552	5

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 125
- Wall Thickness Conform to ASME B 36.10M Specifications



Reducers

Sch20,60,100,120,140,160, XXS



ASME B16.9

(in inches)

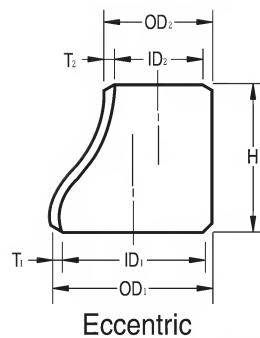
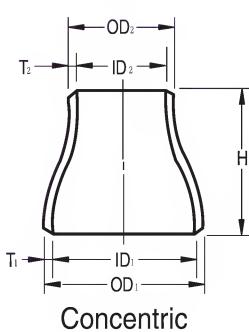
Nominal Pipe Size	Outside Diameter OD_1, OD_2	Wall Thickness T_1, T_2							End to End
		Sch 20	Sch 60	Sch 100	Sch 120	Sch 140	Sch 160	Xxs	
6× 5	6.625	—	—	—	0.562	—	0.719	0.854	5½
	5.563	—	—	—	0.500	—	0.625	0.750	
6× 4	6.625	—	—	—	0.562	—	0.719	0.864	5½
	4.500	—	—	—	0.438	—	0.531	0.674	
6× 3	6.625	—	—	—	—	—	0.719	0.864	5½
	3.500	—	—	—	—	—	0.438	0.600	
6× 2½	6.625	—	—	—	—	—	0.719	0.864	5½
	2.875	—	—	—	—	—	0.375	0.552	
8× 6	8.625	—	—	—	0.719	—	0.906	0.875	6
	6.625	—	—	—	0.562	—	0.719	0.864	
8× 5	8.625	—	—	—	0.719	—	0.906	0.875	6
	5.563	—	—	—	0.500	—	0.625	0.750	
8× 4	8.625	—	—	—	0.719	—	0.906	0.875	6
	4.500	—	—	—	0.438	—	0.531	0.674	
10× 8	10.750	0.250	0.500	0.719	0.844	1.000	1.125	1.000	7
	8.625	0.250	0.406	0.594	0.719	0.812	0.906	0.875	
10× 6	10.750	—	—	—	0.844	—	1.125	1.000	7
	6.625	—	—	—	0.562	—	0.719	0.864	
10× 5	10.750	—	—	—	0.844	—	1.125	1.000	7
	5.563	—	—	—	0.500	—	0.625	0.750	
10× 4	10.750	—	—	—	0.844	—	1.125	1.000	7
	4.500	—	—	—	0.438	—	0.531	0.674	
12×10	12.750	0.250	0.562	0.844	1.000	1.125	1.312	1.000	8
	10.750	0.250	0.500	0.719	0.844	1.000	1.125	1.000	
12× 8	12.750	0.250	0.562	0.844	1.000	1.125	1.312	1.000	8
	8.625	0.250	0.406	0.594	0.719	0.812	0.906	0.875	
12× 6	12.750	—	—	—	1.000	—	1.312	1.000	8
	6.625	—	—	—	0.562	—	0.719	0.864	
14×12	14.000	0.312	0.594	0.938	1.094	1.250	1.406	—	13
	12.750	0.250	0.562	0.844	1.000	1.125	1.312	—	
14×10	14.000	0.312	0.594	0.938	1.094	1.250	1.406	—	13
	10.750	0.250	0.500	0.719	0.844	1.000	1.125	—	
14× 8	14.000	0.312	0.594	0.938	1.094	1.250	1.406	—	13
	8.625	0.250	0.406	0.594	0.719	0.812	0.906	—	
16×14	16.000	0.312	0.656	1.031	1.219	1.438	1.594	—	14
	14.000	0.312	0.594	0.938	1.094	1.250	1.406	—	
16×12	16.000	0.312	0.656	1.031	1.219	1.438	1.594	—	14
	12.750	0.250	0.562	0.844	1.000	1.125	1.312	—	
16×10	16.000	0.312	0.656	1.031	1.219	1.438	1.594	—	14
	10.750	0.250	0.500	0.719	0.844	1.000	1.125	—	
18×16	18.000	0.312	0.750	1.156	1.375	1.562	1.781	—	15
	16.000	0.312	0.656	1.031	1.219	1.438	1.594	—	
18×14	18.000	0.312	0.750	1.156	1.375	1.562	1.781	—	15
	14.000	0.312	0.594	0.938	1.094	1.250	1.406	—	
18×12	18.000	0.312	0.750	1.156	1.375	1.562	1.781	—	15
	12.750	0.250	0.562	0.844	1.000	1.125	1.312	—	

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 125
- Wall Thickness Conform to ASME B 36.10M Specifications

Wrought Steel Butt - Weld Fittings

Reducers

Sch20,60,100,120,140,160



ASME B16.9

(in inches)

Nominal Pipe Size	Outside Diameter OD ₁ , OD ₂	Wall Thickness T ₁ , T ₂						End to End H
		Sch 20	Sch 60	Sch 100	Sch 120	Sch 140	Sch 160	
20×18	20.000	0.375	0.812	1.281	1.500	1.750	1.969	20
	18.000	0.312	0.750	1.156	1.375	1.562	1.781	
20×16	20.000	0.375	0.812	1.281	1.500	1.750	1.969	20
	16.000	0.312	0.656	1.031	1.219	1.438	1.594	
20×14	20.000	0.375	0.812	1.281	1.500	1.750	1.969	20
	14.000	0.312	0.594	0.938	1.094	1.250	1.406	
22×20	22.000	0.375	0.875	1.375	1.625	1.875	2.125	20
	20.000	0.375	0.812	1.281	1.500	1.750	1.969	
22×18	22.000	0.375	0.875	1.375	1.625	1.875	2.125	20
	18.000	0.312	0.750	1.156	1.375	1.562	1.781	
22×16	22.000	0.375	0.875	1.375	1.625	1.875	2.125	20
	16.000	0.312	0.656	1.031	1.219	1.438	1.594	
24×22	24.000	0.375	0.969	1.531	1.812	2.062	2.344	20
	22.000	0.375	0.875	1.375	1.625	1.875	2.125	
24×20	24.000	0.375	0.969	1.531	1.812	2.062	2.344	20
	20.000	0.375	0.812	1.281	1.500	1.750	1.969	
24×18	24.000	0.375	0.969	1.531	1.812	2.062	2.344	20
	18.000	0.312	0.750	1.156	1.375	1.562	1.781	

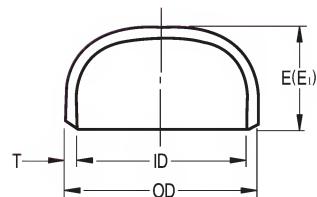
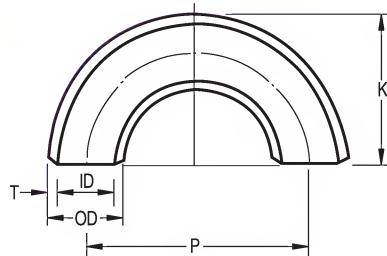
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 125
- Wall Thickness Conform to ASME B 36.10M Specifications

Wrought Steel Butt - Weld Fittings



180° Elbows (Long, Short) Caps

STD (Sch 40), XS (Sch80)



ASME B16.9

(in inches)

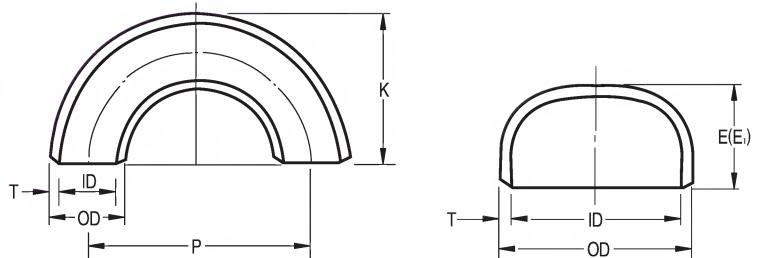
Nominal Pipe Size	Outside Diameter OD	STD(Sch 40)		XS(Sch 80)		Length E	Limiting Wall Thickness For Length E	Length E1	Long		Short	
		ID	T	ID	T				P	K	P	K
1/2	0.840	0.622	0.109	0.546	0.147	1.00	0.18	1.00	3.00	1.88	—	—
3/4	1.050	0.824	0.113	0.742	0.154	1.00	0.15	1.00	2.25	1.69	—	—
1	1.315	1.049	0.133	0.957	0.179	1.50	0.18	1.50	3.00	2.19	2.00	1.62
1 1/4	1.660	1.380	0.140	1.278	0.191	1.50	0.19	1.50	3.75	2.75	2.50	2.06
1 1/2	1.900	1.610	0.145	1.500	0.200	1.50	0.20	1.50	4.50	3.25	3.00	2.44
2	2.375	2.067	0.154	1.939	0.218	1.50	0.22	1.75	6.00	4.19	4.00	3.19
2 1/2	2.875	2.469	0.203	2.323	0.276	1.50	0.28	2.00	7.50	5.19	5.00	3.94
3	3.500	3.068	0.216	2.900	0.300	2.00	0.30	2.50	9.00	6.25	6.00	4.75
3 1/2	4.000	3.548	0.226	3.364	0.318	2.50	0.32	3.00	10.50	7.25	7.00	5.50
4	4.500	4.026	0.237	3.826	0.337	2.50	0.34	3.00	12.00	8.25	8.00	6.25
5	5.563	5.047	0.258	4.813	0.375	3.00	0.38	3.50	15.00	10.31	10.00	7.75
6	6.625	6.065	0.280	5.761	0.432	3.50	0.43	4.00	18.00	12.31	12.00	9.31
8	8.625	7.981	0.322	7.625	0.500	4.00	0.50	5.00	24.00	16.31	16.00	12.31
10	10.750	10.020	0.365	9.750	0.500	5.00	0.50	6.00	30.00	20.38	20.00	15.38
*10	10.750	—	—	9.562	0.594	5.00	0.50	6.00	30.00	20.38	20.00	15.38
12	12.750	12.000	0.375	11.750	0.500	6.00	0.50	7.00	36.00	24.38	24.00	18.38
*12	12.750	11.938	0.406	11.374	0.688	6.00	0.50	7.00	36.00	24.38	24.00	8.38
14	14.000	13.250	0.375	13.000	0.500	6.50	0.50	7.50	42.00	28.00	28.00	21.00
*14	14.000	13.124	0.438	12.500	0.750	6.50	0.50	7.50	42.00	28.00	28.00	21.00
16	16.000	15.250	0.375	15.000	0.500	7.00	0.50	8.00	48.00	32.00	32.00	24.00
*16	16.000	15.000	0.500	14.312	0.844	7.00	0.50	8.00	48.00	32.00	32.00	24.00
18	18.000	17.250	0.375	17.000	0.500	8.00	0.50	9.00	54.00	36.00	36.00	27.00
*18	18.000	16.876	0.562	16.124	0.938	8.00	0.50	9.00	54.00	36.00	36.00	27.00
20	20.000	19.250	0.375	19.000	0.500	9.00	0.50	10.00	60.00	40.00	40.00	30.00
*20	20.000	18.812	0.594	17.938	1.031	9.00	0.50	10.00	60.00	40.00	40.00	30.00
22	22.000	21.250	0.375	21.000	0.500	10.00	0.50	10.00	66.00	44.00	44.00	33.00
*22	22.000	—	—	19.750	1.125	10.00	0.50	10.00	66.00	44.00	44.00	33.00
24	24.000	23.250	0.375	23.000	0.500	10.50	0.50	12.00	72.00	48.00	48.00	36.00
*24	24.000	22.624	0.688	21.562	1.219	10.50	0.50	12.00	72.00	48.00	48.00	36.00
26	26.000	25.250	0.375	25.000	0.500	10.50	—	—	—	—	—	—
28	28.000	27.250	0.375	27.000	0.500	10.50	—	—	—	—	—	—
30	30.000	29.250	0.375	29.000	0.500	10.50	—	—	—	—	—	—
32	32.000	31.250	0.375	31.000	0.500	10.50	—	—	—	—	—	—
*32	32.000	30.624	0.688	—	—	10.50	—	—	—	—	—	—
34	34.000	33.250	0.375	33.000	0.500	10.50	—	—	—	—	—	—
*34	34.000	32.624	0.688	—	—	10.50	—	—	—	—	—	—
36	36.000	35.250	0.375	35.000	0.500	10.50	—	—	—	—	—	—
*36	36.000	34.500	0.750	—	—	10.50	—	—	—	—	—	—
38	38.000	37.250	0.375	37.000	0.500	12.00	—	—	—	—	—	—
40	40.000	39.250	0.375	39.000	0.500	12.00	—	—	—	—	—	—
42	42.000	41.250	0.375	41.000	0.500	12.00	—	—	—	—	—	—
44	44.000	43.250	0.375	43.000	0.500	13.50	—	—	—	—	—	—
46	46.000	45.250	0.375	45.000	0.500	13.50	—	—	—	—	—	—
48	48.000	47.250	0.375	47.000	0.500	13.50	—	—	—	—	—	—

- Length E applies for thickness not exceeding that given in column "Limiting Wall Thickness for Length E."
- Length E₁ applies for thickness greater than that given in column "Limiting Wall Thickness" for NPS 24 and smaller for NPS 26 and larger, length E₁ shall be by agreement between manufacturer and Purchaser.
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Asterisks (*) Denote Sch 40 and Sch 80

Wrought Steel Butt - Weld Fittings

180° Elbows (Long, Short) Caps

Sch20,60,100,120,140,160,XXS



ASME B16.9

(in inches)

Nominal Pipe Size	Outside Diameter OD	Wall Thickness T							Length E	Limiting Wall Thickness For Length E	Length E ₁	Long		Short	
		Sch20	Sch60	Sch100	Sch120	Sch140	Sch160	XXS				P	K	P	K
1/2	0.840	—	—	—	—	—	0.188	0.294	1.00	0.18	1.00	3.00	1.88	—	—
3/4	1.050	—	—	—	—	—	0.219	0.308	1.00	0.15	1.00	2.25	1.69	—	—
1	1.315	—	—	—	—	—	0.250	0.358	1.50	0.18	1.50	3.00	2.19	2.00	1.62
1 1/4	1.660	—	—	—	—	—	0.250	0.382	1.50	0.19	1.50	3.75	2.75	2.50	2.06
1 1/2	1.900	—	—	—	—	—	0.281	0.400	1.50	0.20	1.50	4.50	3.25	3.00	2.44
2	2.375	—	—	—	—	—	0.344	0.436	1.50	0.22	1.75	6.00	4.19	4.00	3.19
2 1/2	2.875	—	—	—	—	—	0.375	0.552	1.50	0.28	2.00	7.50	5.19	5.00	3.94
3	3.500	—	—	—	—	—	0.438	0.600	2.00	0.30	2.50	9.00	6.25	6.00	4.75
4	4.500	—	—	—	0.438	—	0.531	0.674	2.50	0.34	3.00	12.00	8.25	8.00	6.25
5	5.563	—	—	—	0.500	—	0.625	0.750	3.00	0.38	3.50	15.00	10.31	10.00	7.75
6	6.625	—	—	—	0.562	—	0.719	0.864	3.50	0.43	4.00	18.00	12.31	12.00	9.31
8	8.625	0.250	0.406	0.594	0.719	0.812	0.906	0.875	4.00	0.50	5.00	24.00	16.31	16.00	12.31
10	10.750	0.250	0.500	0.719	0.844	1.000	1.125	1.000	5.00	0.50	6.00	30.00	20.38	20.00	15.38
12	12.750	0.250	0.562	0.844	1.000	1.125	1.312	1.000	6.00	0.50	7.00	36.00	24.38	24.00	18.38
14	14.000	0.312	0.594	0.938	1.094	1.250	1.406	—	6.50	0.50	7.50	42.00	28.00	28.00	21.00
16	16.000	0.312	0.656	1.031	1.219	1.438	1.594	—	7.00	0.50	8.00	48.00	32.00	32.00	24.00
18	18.000	0.312	0.750	1.156	1.375	1.562	1.781	—	8.00	0.50	9.00	54.00	36.00	36.00	27.00
20	20.000	0.375	0.812	1.281	1.500	1.750	1.969	—	9.00	0.50	10.00	60.00	40.00	40.00	30.00
22	22.000	0.375	0.875	1.375	1.625	1.875	2.125	—	10.00	0.50	10.00	66.00	44.00	44.00	33.00
24	24.000	0.375	0.969	1.531	1.812	2.062	2.344	—	10.50	0.50	12.00	72.00	48.00	48.00	36.00

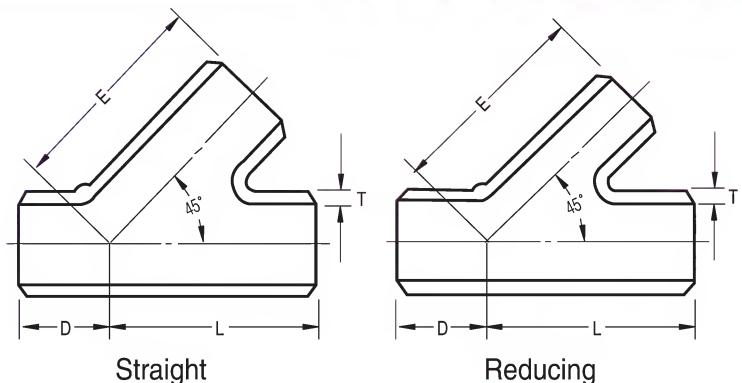
- Length E applies for thickness not exceeding that given in column "Limiting Wall Thickness for Length E."
- Length E₁ applies for thickness greater than that given in column "Limiting Wall Thickness" for NPS 24 and smaller for NPS 26 and larger, length E₁ shall be by agreement between manufacturer and Purchaser.
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- For Approx Weight See Page 122
- Wall Thickness Conform to ASME B 36.10M Specifications

Wrought Steel Butt - Weld Fittings



Laterals

STD, XS



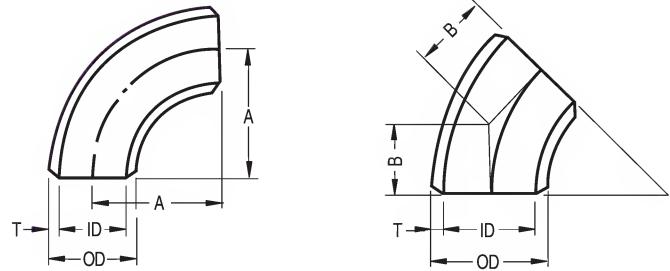
Nominal Pipe Size of Run	Center-to-End Dimension		STD		XS	
	L & E	D	ID	T	ID	T
1	3 $\frac{1}{2}$	1 $\frac{3}{4}$	1.049	0,133	0.957	0.179
1 $\frac{1}{4}$	4 $\frac{1}{4}$	2	1.380	0,140	1.278	0.191
1 $\frac{1}{2}$	5	2 $\frac{1}{2}$	1.610	0,145	1.500	0.200
2	6	3 $\frac{1}{4}$	2.067	0,154	1.939	0.218
2 $\frac{1}{2}$	7	3 $\frac{1}{2}$	2.469	0,203	2.323	0.276
3	7 $\frac{3}{4}$	3 $\frac{3}{4}$	3.068	0,216	2.900	0.300
3 $\frac{1}{2}$	8 $\frac{3}{8}$	4	3.548	0,226	3.364	0.318
4	8 $\frac{1}{2}$	4 $\frac{1}{2}$	4.026	0,237	3.826	0.337
5	11	4 $\frac{1}{4}$	5.047	0,258	4.813	0.375
6	12 $\frac{1}{2}$	5 $\frac{1}{4}$	6.065	0,280	5.761	0.432
8	15 $\frac{1}{4}$	6 $\frac{1}{4}$	7.981	0,322	7.625	0.500
10	18	7	10.020	0,365	9.750	0.500
12	21 $\frac{1}{2}$	8	12.000	0,375	11.750	0.500
14	25	10	13.250	0,375	13.000	0.500
16	28 $\frac{1}{2}$	12	15.250	0,375	15.000	0.500
18	32	13	17.250	0,375	17.000	0.500
20	35	14	19.250	0,375	19.000	0.500
24	41 $\frac{1}{4}$	16 $\frac{1}{4}$	23.250	0,375	23.000	0.500

- Pressure-temperature ratings : Laterals are rated for either 40% of the maximum allowable working pressure for the size and weight schedule of the mating pipe, or 100% of the maximum allowable working pressure for the size and weight schedule of the mating pipe in the latter case, ASME B31.3 is used to calculate reinforcement requirements unless otherwise specified.
- Wall Thickness Conform to ASME B 36.10M Specifications

Stainless Steel Butt - Weld Fittings

90° Elbows(Long, Short)
45° Elbows(Long)

Sch 5S, 10S, 40S, 80S



ASME B16.9, MSS SP-43

(in inches)

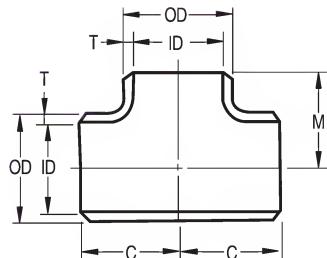
Nominal Pipe Size	Outside Diameter OD	5s		10s		40s		80s		Center to End		
		T	ID	T	ID	T	T	A	B	Long	Short	A
1/2	0.840	0.065	0.674	0.083	0.622	0.109	0.147	1 1/2	5/8	—	—	—
5/8	1.050	0.065	0.884	0.083	0.824	0.113	0.154	1 1/2	7/16	—	—	—
1	1.315	0.065	1.097	0.109	1.049	0.133	0.179	1 1/2	7/8	1	1	1
1 1/4	1.660	0.065	1.442	0.109	1.380	0.140	0.191	1 7/8	1	1	1 1/4	1 1/4
1 1/2	1.900	0.065	1.682	0.109	1.610	0.145	0.200	2 1/4	1 1/8	1 1/2	1 1/2	1 1/2
2	2.375	0.065	2.157	0.109	2.067	0.154	0.218	3	1 3/8	2	2	2
2 1/2	2.875	0.083	2.635	0.120	2.469	0.203	0.276	3 3/4	1 3/4	2 1/2	2 1/2	2 1/2
3	3.500	0.083	3.260	0.120	3.068	0.216	0.300	4 1/2	2	3	3	3
3 1/2	4.000	0.083	3.760	0.120	3.548	0.226	0.318	5 1/4	2 1/4	3 1/2	3 1/2	3 1/2
4	4.500	0.083	4.260	0.120	4.026	0.237	0.337	6	2 1/2	4	4	4
5	5.563	0.109	5.295	0.134	5.047	0.258	0.375	7 1/2	3 1/8	5	5	5
6	6.625	0.109	6.357	0.134	6.065	0.280	0.432	9	3 3/4	6	6	6
8	8.625	0.109	8.329	0.148	7.981	0.322	0.500	12	5	8	8	8
10	10.750	0.134	10.420	0.165	10.020	0.365	0.500	15	6 1/4	10	10	10
12	12.750	0.156	12.390	0.180	12.000	0.375	0.500	18	7 1/2	12	12	12
14	14.000	0.156	13.624	0.188	—	—	—	21	8 3/4	14	14	14
16	16.000	0.165	15.624	0.188	—	—	—	24	10	16	16	16
18	18.000	0.165	17.624	0.188	—	—	—	27	11 1/4	18	18	18
20	20.000	0.188	19.564	0.218	—	—	—	30	12 1/2	20	20	20
22	22.000	0.188	21.564	0.218	—	—	—	33	13 1/2	22	22	22
24	24.000	0.218	23.500	0.250	—	—	—	36	15	24	24	24
30	30.000	0.250	—	—	—	—	—	45	18 1/2	30	30	30

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- Wall Thickness Conform to ASME B 36.19M



Tees(Straight)

Sch 5S, 10S, 40S, 80S



ASME B16.9 MSS SP-43

(in inches)

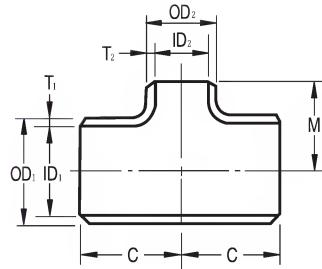
Nominal Pipe Size	Outside Diameter OD	5s		10s		40s		80s		Center to End	Outlet M
		T	ID	T	ID	T	T	Run C			
1/2	0.840	0.065	0.674	0.083	0.622	0.109	0.147	1	1		
5/8	1.050	0.065	0.884	0.083	0.824	0.113	0.154	1 1/8	1 1/8		
1	1.315	0.065	1.097	0.109	1.049	0.133	0.179	1 1/2	1 1/2		
1 1/4	1.660	0.065	1.442	0.109	1.380	0.140	0.191	1 7/8	1 7/8		
1 1/2	1.900	0.065	1.682	0.109	1.610	0.145	0.200	2 1/4	2 1/4		
2	2.375	0.065	2.157	0.109	2.067	0.154	0.218	2 1/2	2 1/2		
2 1/2	2.875	0.083	2.635	0.120	2.469	0.203	0.276	3	3		
3	3.500	0.083	3.260	0.120	3.068	0.216	0.300	3 3/8	3 3/8		
3 1/2	4.000	0.083	3.760	0.120	3.548	0.226	0.318	3 3/4	3 3/4		
4	4.500	0.083	4.260	0.120	4.026	0.237	0.337	4 1/8	4 1/8		
5	5.563	0.109	5.295	0.134	5.047	0.258	0.375	4 7/8	4 7/8		
6	6.625	0.109	6.357	0.134	6.065	0.280	0.432	5 5/8	5 5/8		
8	8.625	0.109	8.329	0.148	7.981	0.322	0.500	7	7		
10	10.750	0.134	10.420	0.165	10.020	0.365	0.500	8 1/2	8 1/2		
12	12.750	0.156	12.390	0.180	12.000	0.375	0.500	10	10		
14	14.000	0.156	13.624	0.188	—	—	—	11	11		
16	16.000	0.165	15.624	0.188	—	—	—	12	12		
18	18.000	0.165	17.624	0.188	—	—	—	13 1/2	13 1/2		
20	20.000	0.188	19.564	0.218	—	—	—	15	15		
22	22.000	0.188	21.564	0.218	—	—	—	16 1/2	16 1/2		
24	24.000	0.218	23.500	0.250	—	—	—	17	17		
30	30.000	0.250	—	—	—	—	—	22	22		

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- Wall Thickness Conform to ASME B 36.19M

Stainless Steel Butt - Weld Fittings

Tees (Reducing)

Sch 5S, 10S, 40S, 80S



ASME B16.9 MSS SP-43

(in inches)

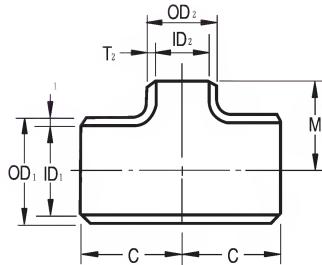
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	Wall Thickness T								Center to End Run C	Outlet M
			5s		10s		40s		80s			
			T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂		
3/4" x 3/4" x 1/2"	1.050	0.840	0.065	0.065	0.083	0.083	0.113	0.109	0.154	0.147	1 1/8	1 1/8
1 1/4" x 1" x 3/4"	1.315	1.050	0.065	0.065	0.109	0.083	0.133	0.113	0.179	0.154	1 1/2	1 1/2
1" x 1" x 1/2"	1.315	0.840	0.065	0.065	0.109	0.083	0.133	0.109	0.179	0.147	1 1/2	1 1/2
1 1/4" x 1 1/4" x 1"	1.660	1.315	0.065	0.065	0.109	0.109	0.140	0.133	0.191	0.179	1 1/8	1 7/8
1 1/4" x 1 1/4" x 3/4"	1.660	1.050	0.065	0.065	0.109	0.083	0.140	0.113	0.191	0.154	1 1/8	1 7/8
1 1/2" x 1 1/2" x 1 1/4"	1.900	1.660	0.065	0.065	0.109	0.109	0.145	0.140	0.200	0.191	2 1/4	2 1/4
1 1/2" x 1 1/2" x 1"	1.900	1.315	0.065	0.065	0.109	0.109	0.145	0.133	0.200	0.179	2 1/4	2 1/4
1 1/2" x 1 1/2" x 3/4"	1.900	1.050	0.065	0.065	0.109	0.083	0.145	0.113	0.200	0.154	2 1/4	2 1/4
2" x 2" x 1 1/2"	2.375	1.900	0.065	0.065	0.109	0.109	0.154	0.145	0.218	0.200	2 1/2	2 3/8
2" x 2" x 1 1/4"	2.375	1.660	0.065	0.065	0.109	0.109	0.154	0.140	0.218	0.191	2 1/2	2 1/4
2" x 2" x 1"	2.375	1.315	0.065	0.065	0.109	0.109	0.154	0.133	0.218	0.179	2 1/2	2
2 1/2" x 2 1/2" x 2"	2.875	2.375	0.083	0.065	0.120	0.109	0.203	0.154	0.276	0.218	3	2 3/4
2 1/2" x 2 1/2" x 1 1/2"	2.875	1.900	0.083	0.065	0.120	0.109	0.203	0.145	0.276	0.200	3	2 5/8
2 1/2" x 2 1/2" x 1 1/4"	2.875	1.660	0.083	0.065	0.120	0.109	0.203	0.140	0.276	0.191	3	2 1/2
3" x 3" x 2 1/2"	3.500	2.875	0.083	0.065	0.120	0.120	0.216	0.203	0.300	0.276	3 3/8	3 1/4
3" x 3" x 2"	3.500	2.375	0.083	0.065	0.120	0.109	0.216	0.154	0.300	0.218	3 3/8	3
3" x 3" x 1 1/2"	3.500	1.900	0.083	0.065	0.120	0.109	0.216	0.145	0.300	0.200	3 3/8	2 7/8
3 1/2" x 3 1/2" x 3"	4.000	3.500	0.083	0.083	0.120	0.120	0.226	0.216	0.318	0.300	3 3/4	3 5/8
3 1/2" x 3 1/2" x 2 1/2"	4.000	2.875	0.083	0.083	0.120	0.120	0.226	0.203	0.318	0.276	3 3/4	2 1/2
3 1/2" x 3 1/2" x 2"	4.000	2.375	0.083	0.065	0.120	0.109	0.226	0.154	0.318	0.218	3 3/4	3 1/4
3 1/2" x 3 1/2" x 1 1/2"	4.000	1.900	0.083	0.065	0.120	0.109	0.226	0.145	0.318	0.200	3 3/4	3 1/8
4" x 4" x 3 1/2"	4.500	4.000	0.083	0.083	0.120	0.120	0.237	0.226	0.337	0.318	4 1/8	4
4" x 4" x 3"	4.500	3.500	0.083	0.083	0.120	0.120	0.237	0.216	0.337	0.300	4 1/8	3 7/8
4" x 4" x 2 1/2"	4.500	2.875	0.083	0.083	0.120	0.120	0.237	0.203	0.337	0.276	4 1/8	3 3/4
4" x 4" x 2"	4.500	2.375	0.083	0.065	0.120	0.120	0.237	0.154	0.337	0.218	4 1/8	3 1/2
5" x 5" x 4"	5.563	4.500	0.109	0.083	0.134	0.120	0.258	0.237	0.375	0.337	4 7/8	4 5/8
5" x 5" x 3 1/2"	5.563	4.000	0.109	0.083	0.134	0.120	0.258	0.226	0.375	0.318	4 7/8	4 1/2
5" x 5" x 3"	5.563	3.500	0.109	0.083	0.134	0.120	0.258	0.216	0.375	0.300	4 7/8	4 3/8
5" x 5" x 2 1/2"	5.563	2.875	0.109	0.083	0.134	0.120	0.258	0.203	0.375	0.276	4 7/8	4 1/4
6" x 6" x 5"	6.625	5.563	0.109	0.109	0.134	0.134	0.280	0.258	0.432	0.375	5 5/8	5 3/8
6" x 6" x 4"	6.625	4.500	0.109	0.083	0.134	1.120	0.280	0.237	0.432	0.337	5 5/8	5 1/8
6" x 6" x 3 1/2"	6.625	4.000	0.109	0.083	0.134	1.120	0.280	0.226	0.432	0.318	5 5/8	5
6" x 6" x 3"	6.625	3.500	0.109	0.083	0.134	1.120	0.280	0.216	0.432	0.300	5 5/8	4 7/8

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- Wall Thickness Conform to ASME B 36.19M



Tees (Reducing)

Sch 5S, 10S, 40S, 80S



ASME B16.9 MSS SP-43

(in inches)

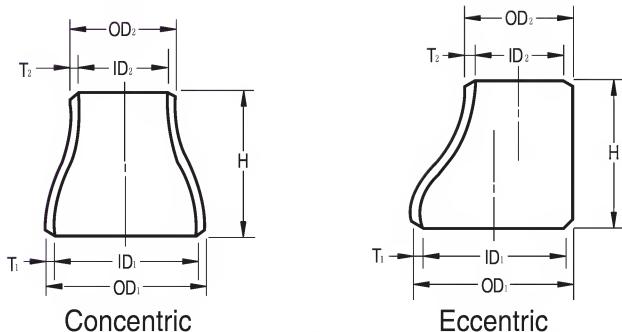
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	Wall Thickness T								Center to End	
			5s		10s		40s		80s			
			T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	Run C	Outlet M
8 × 8 × 6	8.625	6.625	0.109	0.109	0.148	0.134	0.322	0.280	0.500	0.432	7	6 $\frac{5}{8}$
8 × 8 × 5	8.625	5.563	0.109	0.109	0.148	0.134	0.322	0.258	0.500	0.375	7	6 $\frac{3}{8}$
8 × 8 × 4	8.625	4.500	0.109	0.083	0.148	0.120	0.322	0.237	0.500	0.337	7	6 $\frac{1}{8}$
10 × 10 × 8	10.750	8.625	0.134	0.109	0.165	0.148	0.365	0.322	0.500	0.500	8 $\frac{1}{2}$	8
10 × 10 × 6	10.750	6.625	0.134	0.109	0.165	0.134	0.365	0.280	0.500	0.432	8 $\frac{1}{2}$	7 $\frac{5}{8}$
10 × 10 × 5	10.750	5.563	0.134	0.109	0.165	0.134	0.365	0.258	0.500	0.375	8 $\frac{1}{2}$	7 $\frac{1}{2}$
12 × 12 × 10	12.750	10.750	0.156	0.134	0.180	0.165	0.375	0.365	0.500	0.500	10	9 $\frac{1}{2}$
12 × 12 × 8	12.750	8.625	0.156	0.109	0.180	0.148	0.375	0.322	0.500	0.500	10	9
12 × 12 × 6	12.750	6.625	0.156	0.109	0.180	0.134	0.375	0.280	0.500	0.432	10	8 $\frac{5}{8}$
14 × 14 × 12	14.000	12.750	0.156	0.156	0.188	0.180	—	—	—	—	11	10 $\frac{5}{8}$
14 × 14 × 10	14.000	10.750	0.156	0.134	0.188	0.165	—	—	—	—	11	10 $\frac{1}{8}$
14 × 14 × 8	14.000	8.625	0.156	0.109	0.188	0.148	—	—	—	—	11	9 $\frac{3}{4}$
16 × 16 × 14	16.000	14.000	0.165	0.156	0.188	0.188	—	—	—	—	12	12
16 × 16 × 12	16.000	12.750	0.165	0.156	0.188	0.180	—	—	—	—	12	11 $\frac{5}{8}$
16 × 16 × 10	16.000	10.750	0.165	0.134	0.188	0.165	—	—	—	—	12	11 $\frac{1}{8}$
18 × 18 × 16	18.000	16.000	0.165	0.165	0.188	0.188	—	—	—	—	13 $\frac{1}{2}$	13
18 × 18 × 14	18.000	14.000	0.165	0.156	0.188	0.188	—	—	—	—	13 $\frac{1}{2}$	13
18 × 18 × 12	18.000	12.750	0.165	0.156	0.188	0.180	—	—	—	—	13 $\frac{1}{2}$	12 $\frac{3}{8}$
20 × 20 × 18	20.000	18.000	0.188	0.165	0.218	0.188	—	—	—	—	15	14 $\frac{1}{2}$
20 × 20 × 16	20.000	16.000	0.188	0.165	0.218	0.188	—	—	—	—	15	14
20 × 20 × 14	20.000	14.000	0.188	0.156	0.218	0.188	—	—	—	—	15	14
22 × 22 × 20	22.000	20.000	0.188	0.188	0.218	0.218	—	—	—	—	16 $\frac{1}{2}$	16
22 × 22 × 18	22.000	18.000	0.188	0.165	0.218	0.188	—	—	—	—	16 $\frac{1}{2}$	15 $\frac{1}{2}$
22 × 22 × 16	22.000	16.000	0.188	0.165	0.218	0.188	—	—	—	—	16 $\frac{1}{2}$	15
24 × 24 × 22	24.000	22.000	0.218	0.188	0.250	0.218	—	—	—	—	17	17
24 × 24 × 20	24.000	20.000	0.218	0.188	0.250	0.218	—	—	—	—	17	17
24 × 24 × 18	24.000	18.000	0.218	0.165	0.250	0.188	—	—	—	—	17	16 $\frac{1}{2}$
30 × 30 × 24	30.000	24.000	0.250	0.218	—	—	—	—	—	—	22	21
30 × 30 × 22	30.000	22.000	0.250	0.188	—	—	—	—	—	—	22	20 $\frac{1}{2}$
30 × 30 × 20	30.000	20.000	0.250	0.188	—	—	—	—	—	—	22	20

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- Wall Thickness Conforms to ASME B 36.19M

Stainless Steel Butt - Weld Fittings

Reducers

Sch 5S, 10S, 40S, 80S



ASME B16.9 MSS SP-43

(in inches)

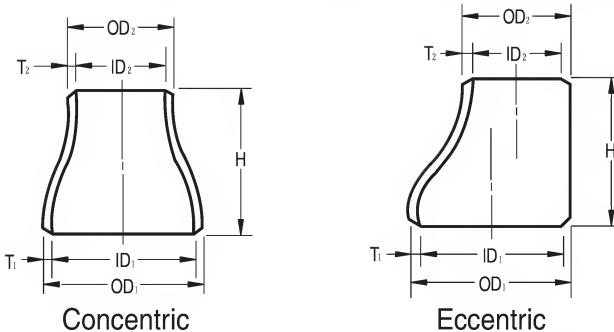
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	Wall Thickness T								End to End H	
			5s		10s		40s		80s			
			T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂		
3/4 × 1/2	1.050	0.840	0.065	0.065	0.083	0.083	0.113	0.109	0.154	0.147	1 1/2	
1 × 3/4	1.315	1.050	0.065	0.065	0.109	0.083	0.133	0.113	0.179	0.154	2	
1 × 1/2	1.315	0.840	0.065	0.065	0.109	0.083	0.133	0.109	0.179	0.147	2	
1 1/4 × 1	1.660	1.135	0.065	0.065	0.109	0.109	0.140	0.133	0.191	0.179	2	
1 1/4 × 3/4	1.660	1.050	0.065	0.065	0.109	0.083	0.140	0.113	0.191	0.154	2	
1 1/4 × 1/2	1.660	0.840	0.065	0.065	0.109	0.083	0.140	0.109	0.191	0.147	2	
1 1/2 × 1 1/4	1.900	1.660	0.065	0.065	0.109	0.109	0.145	0.140	0.200	0.191	2 1/2	
1 1/2 × 1	1.900	1.315	0.065	0.065	0.109	0.109	0.145	0.133	0.200	0.179	2 1/2	
1 1/2 × 3/4	1.900	1.050	0.065	0.065	0.109	0.083	0.145	0.113	0.200	0.154	2 1/2	
1 1/2 × 1/2	1.900	0.840	0.065	0.065	0.109	0.083	0.145	0.109	0.200	0.147	2 1/2	
2 × 1 1/2	2.375	1.900	0.065	0.065	0.109	0.109	0.154	0.145	0.218	0.200	3	
2 × 1 1/4	2.375	1.660	0.065	0.065	0.109	0.109	0.154	0.140	0.218	0.191	3	
2 × 1	2.375	1.315	0.065	0.065	0.109	0.109	0.154	0.133	0.218	0.179	3	
2 × 3/4	2.375	1.050	0.065	0.065	0.109	0.083	0.154	0.113	0.218	0.154	3	
2 1/2 × 2	2.875	2.375	0.083	0.065	0.120	0.109	0.203	0.154	0.276	0.218	3 1/2	
2 1/2 × 1 1/2	2.875	1.900	0.083	0.065	0.120	0.109	0.203	0.145	0.276	0.200	3 1/2	
2 1/2 × 1 1/4	2.875	1.660	0.083	0.065	0.120	0.109	0.203	0.140	0.276	0.191	3 1/2	
3 × 2 1/2	3.500	2.875	0.083	0.083	0.120	0.120	0.216	0.203	0.300	0.276	3 1/2	
3 × 2	3.500	2.375	0.083	0.065	0.120	0.109	0.216	0.154	0.300	0.218	3 1/2	
3 × 1 1/2	3.500	1.900	0.083	0.065	0.120	0.109	0.216	0.145	0.300	0.200	3 1/2	
3 × 1 1/4	3.500	1.660	0.083	0.065	0.120	0.109	0.216	0.140	0.300	0.191	3 1/2	
3 1/2 × 3	4.000	3.500	0.083	0.083	0.120	0.120	0.226	0.216	0.318	0.300	4	
3 1/2 × 2 1/2	4.000	2.875	0.083	0.083	0.120	0.120	0.226	0.203	0.318	0.276	4	
3 1/2 × 2	4.000	2.375	0.083	0.065	0.120	0.109	0.226	0.154	0.318	0.218	4	
4 × 3 1/2	4.500	4.000	0.083	0.083	0.120	0.120	0.237	0.226	0.337	0.318	4	
4 × 3	4.500	3.500	0.083	0.083	0.120	0.120	0.237	0.216	0.337	0.300	4	
4 × 2 1/2	4.500	2.875	0.083	0.083	0.120	0.120	0.237	0.203	0.337	0.276	4	
4 × 2	4.500	2.375	0.083	0.065	0.120	0.109	0.237	0.154	0.337	0.218	4	
5 × 4	5.563	4.500	0.109	0.083	0.134	0.120	0.258	0.237	0.375	0.337	5	
5 × 3 1/2	5.563	4.000	0.109	0.083	0.134	0.120	0.258	0.226	0.375	0.318	5	
5 × 3	5.563	3.500	0.109	0.083	0.134	0.120	0.258	0.216	0.375	0.300	5	
5 × 2 1/2	5.563	2.875	0.109	0.083	0.134	0.120	0.258	0.203	0.375	0.276	5	
6 × 5	6.625	5.563	0.109	0.109	0.134	0.134	0.134	0.280	0.258	0.432	0.375	5 1/2
6 × 4	6.625	4.500	0.109	0.083	0.134	0.120	0.280	0.237	0.432	0.337	5 1/2	
6 × 3 1/2	6.625	4.000	0.109	0.083	0.134	0.120	0.280	0.226	0.432	0.318	5 1/2	
6 × 3	6.625	3.500	0.109	0.083	0.134	0.120	0.280	0.216	0.432	0.300	5 1/2	

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- Wall Thickness Conform to ASME B 36.19M



Reducers

Sch 5S, 10S, 40S, 80S



ASME B16.9 MSS SP-43

(in inches)

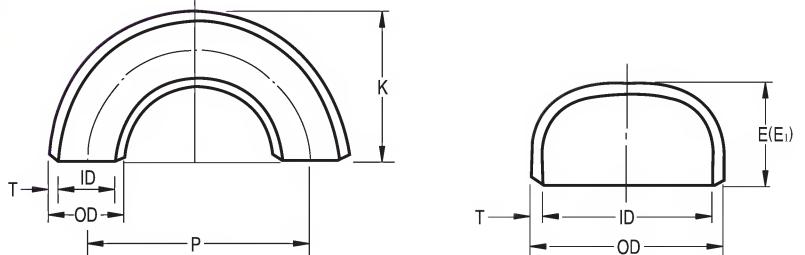
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	Wall Thickness T								End to End H	
			5s		10s		40s		80s			
			T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂		
8 × 6	8.625	6.625	0.109	0.109	0.148	0.134	0.322	0.280	0.500	0.432	6	
8 × 5	8.625	5.563	0.109	0.109	0.148	0.134	0.322	0.258	0.500	0.375	6	
8 × 4	8.625	4.500	0.109	0.083	0.148	0.120	0.322	0.237	0.500	0.337	6	
10 × 8	10.750	8.625	0.134	0.109	0.165	0.148	0.365	0.322	0.500	0.500	7	
10 × 6	10.750	6.625	0.134	0.109	0.165	0.134	0.365	0.280	0.500	0.432	7	
10 × 5	10.750	5.563	0.134	0.109	0.165	0.134	0.365	0.258	0.500	0.375	7	
12 × 10	12.750	10.750	0.156	0.134	0.180	0.165	0.375	0.365	0.500	0.500	8	
12 × 8	12.750	8.625	0.156	0.109	0.180	0.148	0.375	0.322	0.500	0.500	8	
12 × 6	12.750	6.625	0.156	0.109	0.180	0.134	0.375	0.280	0.500	0.432	8	
14 × 12	14.000	12.750	0.156	0.156	0.188	0.180	—	—	—	—	13	
14 × 10	14.000	10.750	0.156	0.134	0.188	0.165	—	—	—	—	13	
14 × 8	14.000	8.625	0.156	0.109	0.188	0.148	—	—	—	—	13	
16 × 14	16.000	14.000	0.165	0.156	0.188	0.188	—	—	—	—	14	
16 × 12	16.000	12.750	0.165	0.156	0.188	0.180	—	—	—	—	14	
16 × 10	16.000	10.750	0.165	0.134	0.188	0.165	—	—	—	—	14	
18 × 16	18.000	16.000	0.165	0.165	0.188	0.188	—	—	—	—	15	
18 × 14	18.000	14.000	0.165	0.156	0.188	0.188	—	—	—	—	15	
18 × 12	18.000	12.750	0.165	0.156	0.188	0.180	—	—	—	—	15	
20 × 18	20.000	18.000	0.188	0.165	0.218	0.188	—	—	—	—	20	
20 × 16	20.000	16.000	0.188	0.165	0.218	0.188	—	—	—	—	20	
20 × 14	20.000	14.000	0.188	0.156	0.218	0.188	—	—	—	—	20	
22 × 20	22.000	20.000	0.188	0.188	0.218	0.218	—	—	—	—	20	
22 × 18	22.000	18.000	0.188	0.165	0.218	0.188	—	—	—	—	20	
22 × 16	22.000	16.000	0.188	0.165	0.218	0.188	—	—	—	—	20	
24 × 22	24.000	22.000	0.218	0.188	0.250	0.218	—	—	—	—	20	
24 × 20	24.000	20.000	0.218	0.188	0.250	0.218	—	—	—	—	20	
24 × 18	24.000	18.000	0.218	0.165	0.250	0.188	—	—	—	—	20	
30 × 24	30.000	24.000	0.250	0.218	—	—	—	—	—	—	24	
30 × 22	30.000	22.000	0.250	0.188	—	—	—	—	—	—	24	
30 × 20	30.000	20.000	0.250	0.188	—	—	—	—	—	—	24	

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- Wall Thickness Conform to ASME B 36.19M

Stainless Steel Butt - Weld Fittings

180° Elbows (Long, Short) Caps

Sch 5S, 10S, 40S, 80S



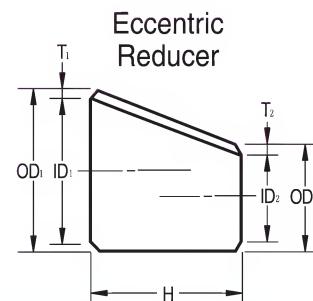
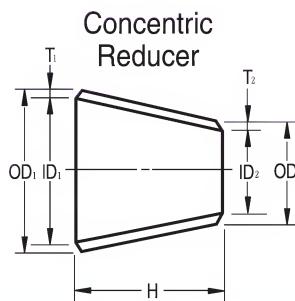
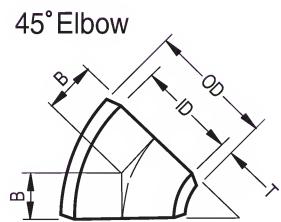
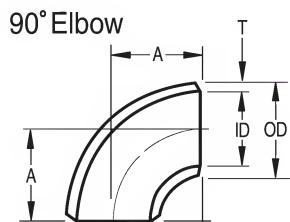
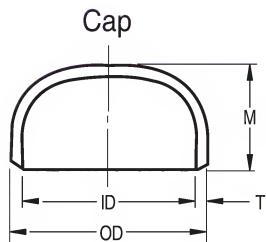
ASME B16.9, MSS SP-43

(in inches)

Nominal Pipe Size	Outside Diameter OD	Wall Thickness T				Length E	Limiting Wall Thickness For Length E	Length E ₁	Long		Short	
		5s	10s	40s	80s				P	K	P	K
1/2	0.840	0.065	0.083	0.109	0.147	1.00	0.18	1.00	3.00	1.88	—	—
3/4	1.050	0.065	0.083	0.113	0.154	1.00	0.15	1.00	2.25	1.69	—	—
1	1.315	0.065	0.109	0.133	0.179	1.50	0.18	1.50	3.00	2.19	2.00	1.62
1 1/4	1.660	0.065	0.109	0.140	0.191	1.50	0.19	1.50	3.75	2.75	2.50	2.06
1 1/2	1.900	0.065	0.109	0.145	0.200	1.50	0.20	1.50	4.50	3.25	3.00	2.44
2	2.375	0.065	0.109	0.154	0.218	1.50	0.22	1.75	6.00	4.19	4.00	3.19
2 1/2	2.875	0.083	0.120	0.203	0.276	1.50	0.28	2.00	7.50	5.19	5.00	3.94
3	3.500	0.083	0.120	0.216	0.300	2.00	0.30	2.50	9.00	6.25	6.00	4.75
3 1/2	4.000	0.083	0.120	0.226	0.318	2.50	0.32	3.00	10.50	7.25	7.00	5.50
4	4.500	0.083	0.120	0.237	0.337	2.50	0.34	3.00	12.00	8.25	8.00	6.25
5	5.563	0.109	0.134	0.258	0.375	3.00	0.38	3.50	15.00	10.31	10.00	7.75
6	6.625	0.109	0.134	0.280	0.432	3.50	0.43	4.00	18.00	12.31	12.00	9.31
8	8.625	0.109	0.148	0.322	0.500	4.00	0.50	5.00	24.00	16.31	16.00	12.31
10	10.750	0.134	0.165	0.365	0.500	5.00	0.50	6.00	30.00	20.38	20.00	15.38
12	12.750	0.156	0.180	0.375	0.500	6.00	0.50	7.00	36.00	24.38	24.00	18.38
14	14.000	0.156	0.188	—	—	6.50	0.50	7.50	42.00	28.00	28.00	21.00
16	16.000	0.165	0.188	—	—	7.00	0.50	8.00	48.00	32.00	32.00	24.00
18	18.000	0.165	0.188	—	—	8.00	0.50	9.00	54.00	36.00	36.00	27.00
20	20.000	0.188	0.218	—	—	9.00	0.50	10.00	60.00	40.00	40.00	30.00
22	22.000	0.188	0.218	—	—	10.00	0.50	10.00	66.00	44.00	44.00	33.00
24	24.000	0.218	0.250	—	—	10.50	0.50	12.00	72.00	48.00	48.00	36.00
30	30.000	0.250	0.312	—	—	10.50	—	—	—	—	—	—

- Length E applies for thickness not exceeding that given in column "Limiting Wall Thickness for Length E."
- Length E₁ applies for thickness greater than that given in column "Limiting Wall Thickness" for NPS 24 and smaller for NPS 26 and larger, length E₁ shall be by agreement between manufacturer and Purchaser.
- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- Wall Thickness Conform to ASME B 36.19M

Stainless Steel Butt - Weld Fittings



(in inches)

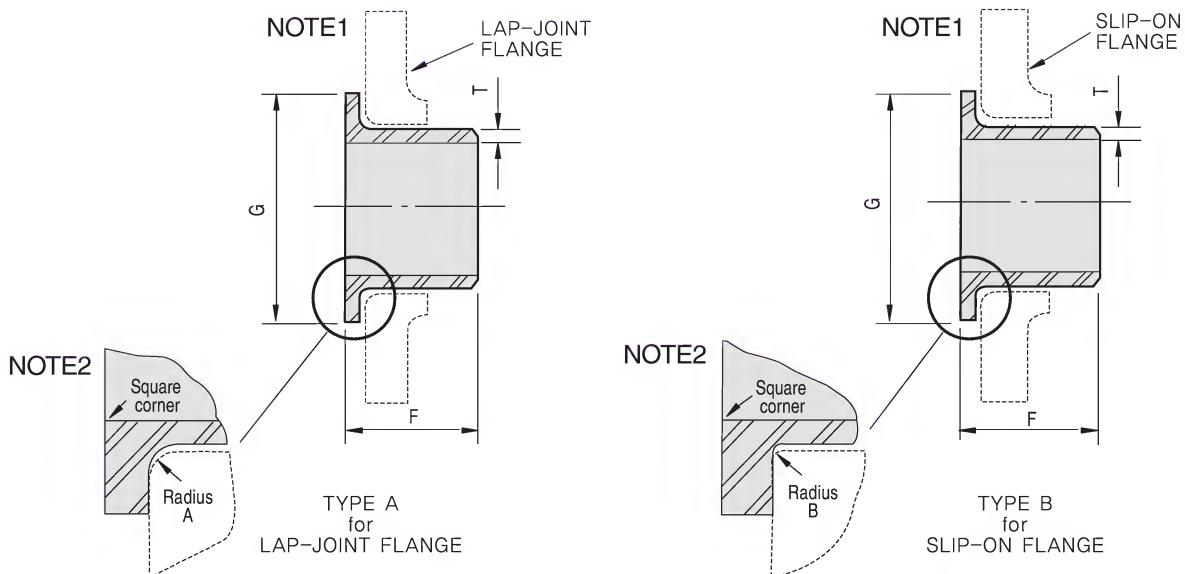
NPS	OD	ELBOW				
		SCH		LONG		SHORT
		STD	X-S	A	B	A
50	50.0	9.5	12.7	75.00	31.07	50.00
52	52.0	9.5	12.7	78.00	32.31	52.00
54	54.0	9.5	12.7	81.00	33.55	54.00
56	56.0	9.5	12.7	84.00	34.79	56.00
58	58.0	9.5	12.7	87.00	36.04	58.00
60	60.0	9.5	12.7	90.00	37.28	60.00
62	62.0	9.5	12.7	93.00	38.52	62.00
64	64.0	9.5	12.7	96.00	39.76	64.00
66	66.0	9.5	12.7	99.00	41.01	66.00
68	68.0	9.5	12.7	102.00	42.25	68.00
70	70.0	9.5	12.7	105.00	43.49	70.00
72	72.0	9.5	12.7	108.00	44.74	72.00
74	74.0	9.5	12.7	111.00	45.98	74.00
76	76.0	9.5	12.7	114.00	47.22	76.00
78	78.0	9.5	12.7	117.00	48.46	78.00
80	80.0	9.5	12.7	120.00	49.71	80.00
82	82.0	9.5	12.7	123.00	50.95	82.00

- REDUCER : 50" 이상 전 사양 CONICAL TYPE으로 제작 가능, "H"치수는 고객의 사양에 의거.
- CAP : 50" 이상 전 사양 제작 가능, "M"치수는 고객의 사양에 의거

Stainless Steel Butt - Weld Fittings

Lap Joint(Stub Ends)

Sch 5S, 10S, 40S,



MSS SP-43

(in inches)

Nominal Pipe Size	Outside Diameter OD	Length F	Dia. of Lap-G Nominal & Maximum	Radius of Fillet		Wall Thickness T			Approx. Weight(kg)		
				A Nominal Max	B Max.	Sch 5s	Sch 10s	Sch 40s	Sch 5s	Sch 10s	Sch 40s
1/2	0.84	2.00	1.38	0.12	0.03	0.065	0.083	0.109	0.049	0.062	0.079
3/4	1.05	2.00	1.69	0.12	0.03	0.065	0.083	0.113	0.064	0.081	0.101
1	1.32	2.00	2.00	0.12	0.03	0.065	0.109	0.133	0.082	0.134	0.160
1 1/4	1.66	2.00	2.50	0.19	0.03	0.065	0.109	0.140	0.109	0.178	0.225
1 1/2	1.90	2.00	2.88	0.25	0.03	0.065	0.109	0.145	0.129	0.213	0.279
2	2.38	2.50	3.62	0.31	0.03	0.065	0.109	0.154	0.204	0.338	0.471
2 1/2	2.88	2.50	4.12	0.31	0.03	0.083	0.120	0.203	0.313	0.448	0.740
3	3.50	2.50	5.00	0.38	0.03	0.083	0.120	0.216	0.400	0.574	1.01
3 1/2	4.00	3.00	5.50	0.38	0.03	0.083	0.120	0.226	0.522	0.150	1.38
4	4.50	3.00	6.19	0.44	0.03	0.083	0.120	0.237	0.606	0.870	1.68
5	5.56	3.00	7.31	0.44	0.06	0.109	0.134	0.258	0.985	1.21	2.28
6	6.62	3.50	8.50	0.50	0.06	0.109	0.134	0.280	1.34	1.64	3.37
8	8.62	4.00	10.62	0.50	0.06	0.109	0.148	0.322	1.96	2.65	5.67
10	10.75	5.00	12.75	0.50	0.06	0.134	0.165	0.365	3.57	4.38	9.55
12	12.75	6.00	15.00	0.50	0.06	0.156	0.180	0.375	5.85	6.74	13.8
14	14.00	6.00	16.25	0.50	0.06	0.156	0.188	×	6.42	7.73	×
16	16.00	6.00	18.50	0.50	0.06	0.165	0.188	×	7.91	9.00	×
18	18.00	6.00	21.00	0.50	0.06	0.165	0.188	×	9.24	10.5	×
20	20.00	6.00	23.00	0.50	0.06	0.188	0.218	×	11.7	13.5	×
24	24.00	6.00	27.25	0.50	0.06	0.218	0.250	×	16.5	18.9	×

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 120
- Wall Thickness Conform to ASME B 36.19M

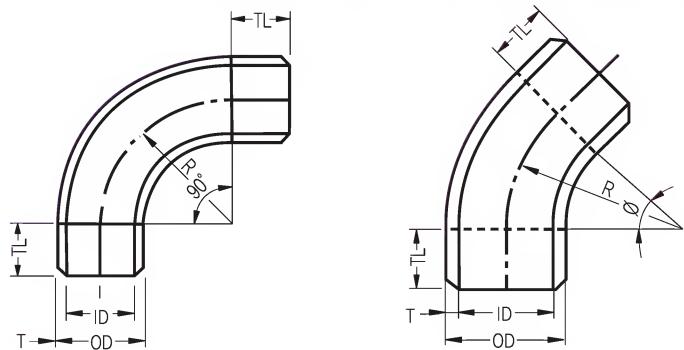
- Minimun Lap Thickness Shall Not Be Less Than Nominal Wall Thickness.
- Contact Faces of Stub Ends Shall Have a Modified Spiral or Concentric Serration.

Wrought Steel Butt - Weld Fittings



Pipe Bend

STD (Sch 40)



ASME B16.9

(in inches)

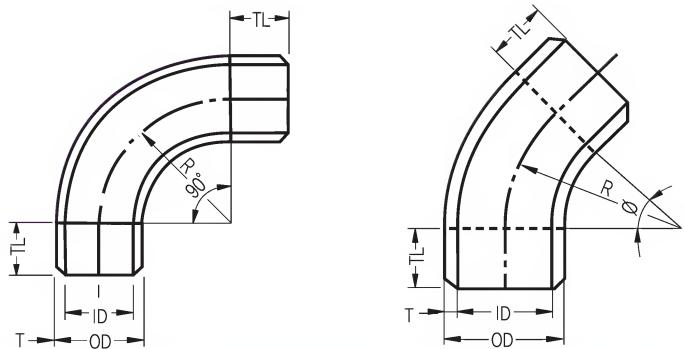
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T
$\frac{1}{2}$	0.840	0.622	0.109
$\frac{3}{4}$	1.050	0.824	0.113
1	1.315	1.049	0.133
$1\frac{1}{4}$	1.660	1.380	0.140
$1\frac{1}{2}$	1.900	1.610	0.145
2	2.375	2.067	0.154
$2\frac{1}{2}$	2.875	2.469	0.203
3	3.500	3.068	0.216
$3\frac{1}{2}$	4.000	3.548	0.226
4	4.500	4.026	0.237
5	5.563	5.047	0.258
6	6.625	6.065	0.280
8	8.625	7.981	0.322
10	10.750	10.020	0.365
12	12.750	12.000	0.375
*12	12.750	11.938	0.406
14	14.000	13.250	0.375
*14	14.000	13.124	0.438
16	16.000	15.250	0.375
*16	16.000	15.000	0.500
18	18.000	17.250	0.375

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- TL, R, Ø : Specified in Purchaser order
- For General Bending Range See Page 58
- Asterisks (*) Denote Sch 40

Wrought Steel Butt - Weld Fittings

Pipe Bend

STD (Sch 40)



(in inches)

ASME B16.9

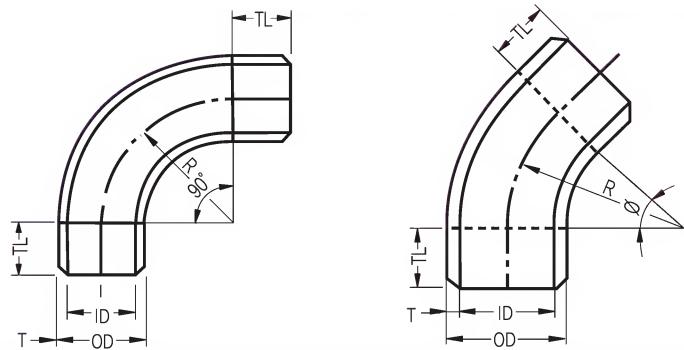
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T
*18	18.000	16.876	0.562
20	20.000	19.250	0.375
*20	20.000	18.812	0.594
22	22.000	21.250	0.375
24	24.000	23.250	0.375
*24	24.000	22.624	0.688
26	26.000	25.250	0.375
28	28.000	27.250	0.375
30	30.000	29.250	0.375
32	32.000	31.250	0.375
*32	32.000	30.624	0.688
34	34.000	33.250	0.375
*34	34.000	32.624	0.688
36	36.000	35.250	0.375
*36	36.000	34.500	0.750
38	38.000	37.250	0.375
40	40.000	39.250	0.375
42	42.000	41.250	0.375
44	44.000	43.250	0.375
46	46.000	45.250	0.375
48	48.000	47.250	0.375

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- TL, R, Ø : Specified in Purchaser order
- For General Bending Range See Page 58
- Asterisks(*) Denote Sch 40



Pipe Bend

XS (Sch 80)



ASME B16.9

(in inches)

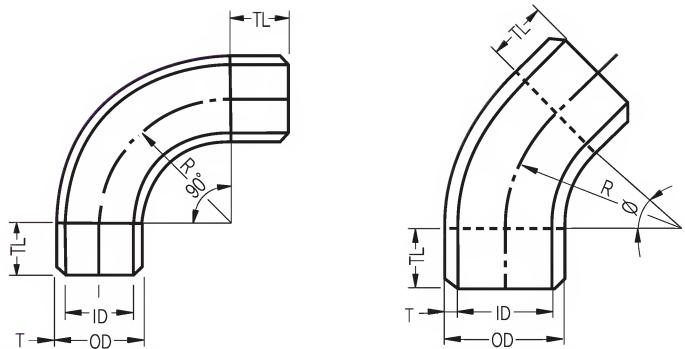
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T
$\frac{1}{2}$	0.840	0.546	0.147
$\frac{3}{4}$	1.050	0.742	0.154
1	1.315	0.957	0.179
$1\frac{1}{4}$	1.660	1.278	0.191
$1\frac{1}{2}$	1.900	1.500	0.200
2	2.375	1.939	0.218
$2\frac{1}{2}$	2.875	2.323	0.276
3	3.500	2.900	0.300
$3\frac{1}{2}$	4.000	3.364	0.318
4	4.500	3.826	0.337
5	5.563	4.813	0.375
6	6.625	5.761	0.432
8	8.625	7.625	0.500
10	10.750	9.750	0.500
*10	10.750	9.562	0.594
12	12.750	11.750	0.500
*12	12.750	11.374	0.688
14	14.000	13.000	0.500
*14	14.000	12.500	0.750
16	16.000	15.000	0.500
*16	16.000	14.312	0.844

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- TL, R, \emptyset : Specified in Purchaser order
- For General Bending Range See Page 58
- Asterisks(*) Denote Sch 80

Wrought Steel Butt - Weld Fittings

Pipe Bend

XS (Sch 80)



ASME B16.9

(in inches)

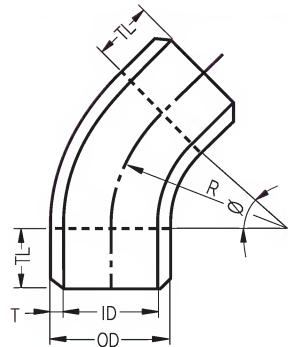
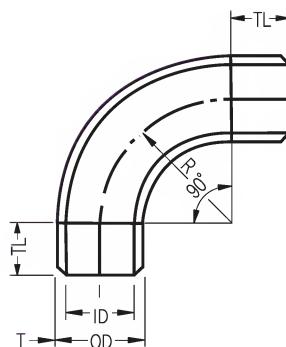
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T
18	18.000	17.000	0.500
*18	18.000	16.124	0.938
20	20.000	19.000	0.500
*20	20.000	17.938	1.031
22	22.000	21.000	0.500
*22	22.000	19.750	1.125
24	24.000	23.000	0.500
*24	24.000	21.562	1.219
26	26.000	25.000	0.500
28	28.000	27.000	0.500
30	30.000	29.000	0.500
32	32.000	31.000	0.500
34	34.000	33.000	0.500
36	36.000	35.000	0.500
38	38.000	37.000	0.500
40	40.000	39.000	0.500
42	42.000	41.000	0.500
44	44.000	43.000	0.500
46	46.000	45.000	0.500
48	48.000	47.000	0.500

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- TL, R, Ø : Specified in Purchaser order
- For General Bending Range See Page 58
- Asterisks(*) Denote Sch 80



Reducers

Sch20,60,100,120,140,160,XXS



ASME B16.9

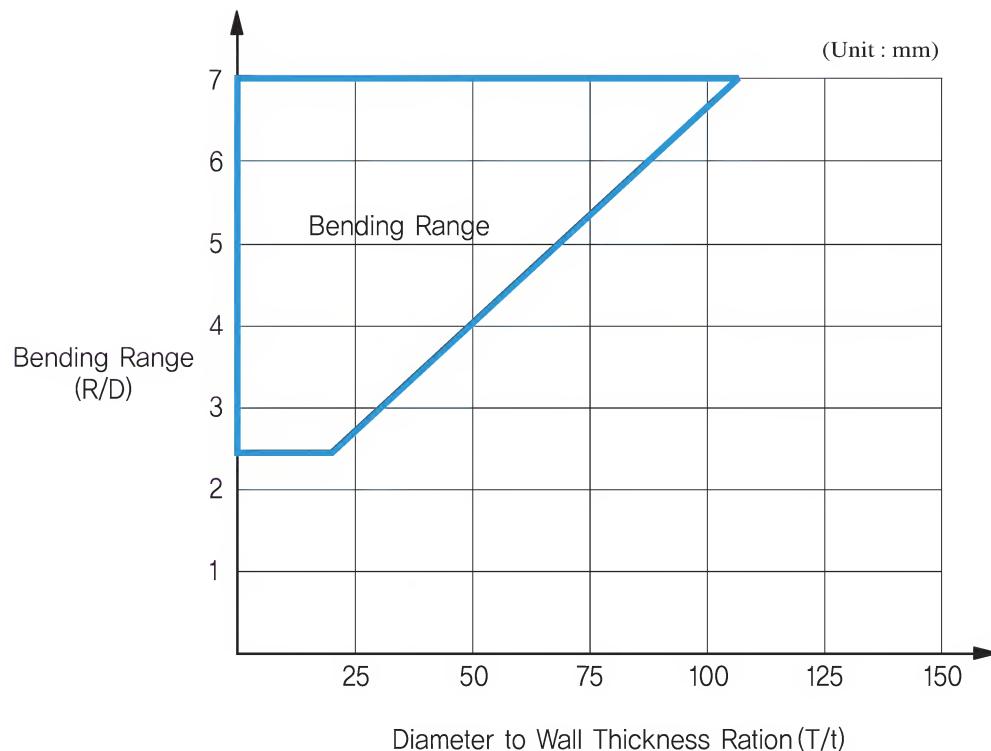
(in inches)

Nominal Pipe Size	Outside Diameter OD	Wall Thickness T					
		Sch 20	Sch 60	Sch 100	Sch 120	Sch 140	Sch 160
1/2	0.840	—	—	—	—	—	0.188
3/4	1.050	—	—	—	—	—	0.219
1	1.315	—	—	—	—	—	0.250
1 1/4	1.660	—	—	—	—	—	0.250
1 1/2	1.900	—	—	—	—	—	0.281
2	2.375	—	—	—	—	—	0.344
2 1/2	2.875	—	—	—	—	—	0.375
3	3.500	—	—	—	—	—	0.438
4	4.500	—	—	—	0.438	—	0.531
5	5.563	—	—	—	0.500	—	0.625
6	6.625	—	—	—	0.562	—	0.719
8	8.625	0.250	0.406	0.594	0.719	0.812	0.906
10	10.750	0.250	0.500	0.719	0.844	1.000	1.125
12	12.750	0.250	0.562	0.844	1.000	1.125	1.312
14	14.000	0.312	0.594	0.938	1.094	1.250	1.406
16	16.000	0.312	0.656	1.031	1.219	1.438	1.594
18	18.000	0.312	0.750	1.156	1.375	1.562	1.781
20	20.000	0.375	0.812	1.281	1.500	1.750	1.969
22	22.000	0.375	0.875	1.375	1.625	1.875	2.125
24	24.000	0.375	0.969	1.531	1.812	2.062	2.344

- For Bevel Details See Page 115
- For Dimensional Tolerances See Page 114
- TL, R, Ø : Specified in Purchaser order
- For General Bending Range See Page 58

Wrought Steel Butt - Weld Fittings

General Bending Range



Where :

D = Pipe Diameter in mm

t = Pipe Wall Thickness in mm

R = Bending Radius in mm

※ Bending Range

- Max. Size(O.D) : 48inch
- Max. Pipe Thickness : 50mm

KS/J IS

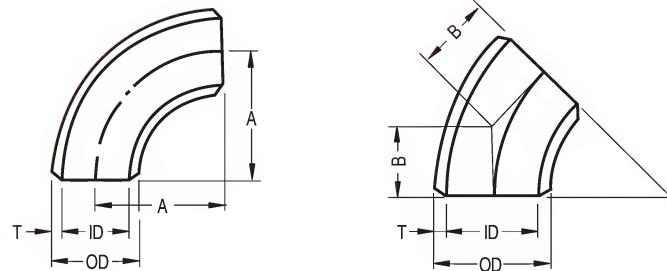
- Steel Butt-Weld Pipe Fittings __ P61~P72
- Steel Plate Butt-Weld Fittings __ P73~P77
- Stainless Steel Butt-Weld Fittings __ P78~P84

Steel Butt - Weld Pipe Fittings



90° Elbows(Long, Short)
45° Elbows(Long, Short)

SPP . SGP



KS B1522, JIS B2311

(in millimeters)

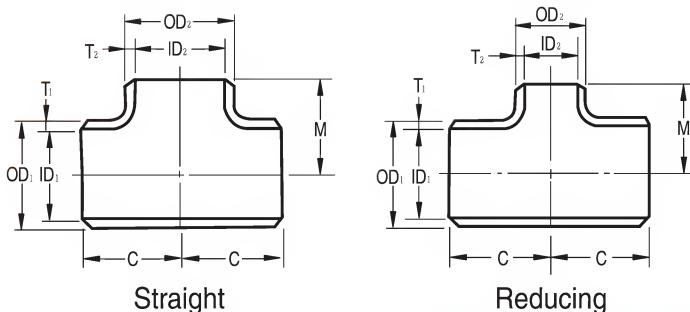
Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	Long		Short	
				A	B	A	B
1/2	21.7	16.1	2.8	38.1	15.8	—	—
3/4	27.2	21.6	2.8	38.1	15.8	—	—
1	34.0	27.6	3.2	38.1	15.8	25.4	—
1 1/4	42.7	35.7	3.5	47.6	19.7	31.8	13.2
1 1/2	48.6	41.6	3.5	57.2	23.7	38.1	15.8
2	60.5	52.9	38.	76.2	31.6	50.8	21.0
2 1/2	76.3	67.9	4.2	95.3	39.5	63.5	26.3
3	89.1	80.7	4.2	114.3	47.3	76.2	31.6
3 1/2	101.6	93.2	4.2	133.4	55.3	88.9	36.8
4	114.3	105.3	4.5	152.4	63.1	101.6	42.1
5	139.8	130.8	4.5	190.5	78.9	127.0	52.6
6	165.2	155.2	5.0	228.6	94.7	152.4	63.1
8	216.3	204.7	5.8	304.8	126.2	203.2	84.2
10	267.4	254.2	6.6	381.0	157.8	254.0	105.2
12	318.5	304.7	6.9	457.2	189.4	304.8	126.2
14	355.6	339.8	7.9	533.4	220.9	355.6	147.3
16	406.4	390.6	7.9	609.6	252.5	406.4	168.3
18	457.2	441.4	7.9	685.8	284.1	457.2	189.4
20	508.0	492.2	7.9	762.0	315.6	508.0	210.4

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 122

Steel Butt - Weld Pipe Fittings

Tees

SPP . SGP



KS B1522, JIS B2311

(in millimeters)

Nominal Pipe Size	Run			Outlet			C	M
	Outside Diameter OD ₁	Inside Diameter ID ₁	Wall Thickness T ₁	Outside Diameter OD ₂	Inside Diameter ID ₂	Wall Thickness T ₂		
1/2	21,7	16.1	2.8	21.7	16.1	2.8	25.4	25.4
3/4	27,2	21.6	2.8	21.2	21.6	2.8	28.6	28.6
3/4 × 3/4 × 1/2	27,2	21.6	2.8	21.7	16.1	2.8	28.6	28.6
1	34.0	27.6	3.2	34.0	27.6	3.2	38.1	38.1
1 × 1 × 3/4	34.0	27.6	3.2	27.2	21.6	2.8	38.1	38.1
1 × 1 × 1/2	34.0	27.6	3.2	21.7	16.1	2.8	38.1	38.1
1 1/4	42.7	35.7	3.5	42.7	35.7	3.5	47.6	47.6
1 1/4 × 1 1/4 × 1	42.7	35.7	3.5	34.0	27.6	3.2	47.6	47.6
1 1/4 × 1 1/4 × 3/4	42.7	35.7	3.5	27.2	21.6	2.8	47.6	47.6
1 1/2	48.6	41.6	3.5	48.6	41.6	3.5	57.2	57.2
1 1/2 × 1 1/2 × 1 1/4	48.6	41.6	3.5	42.7	35.7	3.5	57.2	57.2
1 1/2 × 1 1/2 × 1	48.6	41.6	3.5	34.0	27.6	3.2	57.2	57.2
1 1/2 × 1 1/2 × 3/4	48.6	41.6	3.5	27.2	21.6	2.8	57.2	57.2
2	60.5	52.9	3.8	60.5	52.9	3.8	63.5	63.5
2 × 2 × 1 1/2	60.5	52.9	3.8	48.6	41.6	3.5	63.5	60.3
2 × 2 × 1 1/4	60.5	52.9	3.8	42.7	35.7	3.5	63.5	57.2
2 × 2 × 1	60.5	52.9	3.8	34.0	27.6	3.2	63.5	50.8
2 1/2	76.3	67.9	4.2	76.3	67.9	4.2	76.2	76.2
2 1/2 × 2 1/2 × 2	76.3	67.9	4.2	60.5	52.9	3.8	76.2	69.9
2 1/2 × 2 1/2 × 1 1/2	76.3	67.9	4.2	48.6	41.6	3.5	76.2	66.7
2 1/2 × 2 1/2 × 1 1/4	76.3	67.9	4.2	42.7	35.7	3.5	76.2	63.5
3	89.1	80.7	4.2	89.1	80.7	4.2	85.7	85.7
3 × 3 × 2 1/2	89.1	80.7	4.2	76.3	67.9	4.2	85.7	82.6
3 × 3 × 2	89.1	80.7	4.2	60.5	52.9	3.8	85.7	76.2
3 × 3 × 1 1/2	89.1	80.7	4.2	48.6	41.6	3.5	85.7	73.0
3 1/2	101.6	93.2	4.2	101.6	93.2	4.2	95.3	95.3
3 1/2 × 3 1/2 × 3	101.6	93.2	4.2	89.1	80.7	4.2	95.3	92.1
3 1/2 × 3 1/2 × 2 1/2	101.6	93.2	4.2	76.3	67.9	4.2	95.3	88.9
3 1/2 × 3 1/2 × 2	101.6	93.2	4.2	60.5	52.9	3.8	95.3	82.6
3 1/2 × 3 1/2 × 1 1/2	101.6	93.2	4.2	48.6	41.6	3.5	95.3	79.4
4	114.3	105.3	4.5	114.3	105.3	4.5	104.8	104.8
4 × 4 × 3 1/2	114.3	105.3	4.5	101.6	93.2	4.2	104.8	101.6
4 × 4 × 3	114.3	105.3	4.5	89.1	80.7	4.2	104.8	98.4
4 × 4 × 2 1/2	114.3	105.3	4.5	76.3	67.9	4.2	104.8	95.3
4 × 4 × 2	114.3	105.3	4.5	60.5	52.9	3.8	104.8	88.9

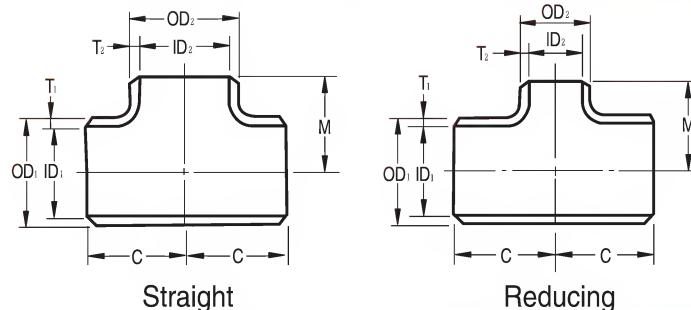
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 124

Steel Butt - Weld Pipe Fittings



Tees

SPP . SGP



KS B1522, JIS B2311

(in millimeters)

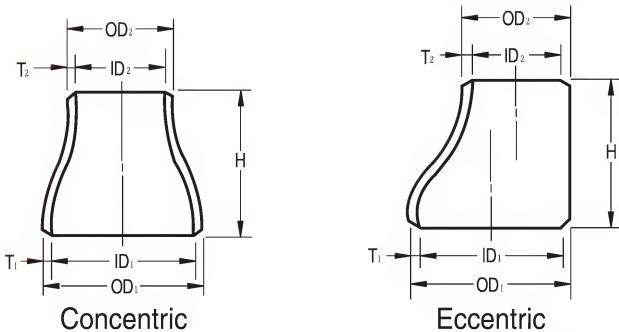
Nominal Pipe Size	Run			Outlet			C	M
	Outside Diameter OD ₁	Inside Diameter ID ₁	Wall Thickness T ₁	Outside Diameter OD ₂	Inside Diameter ID ₂	Wall Thickness T ₂		
5	139.8	130.8	4.5	139.8	130.8	4.5	123.8	123.8
5 × 5 × 4	139.8	130.8	4.5	114.3	105.3	4.5	123.8	117.5
5 × 5 × 3½	139.8	130.8	4.5	101.6	93.2	4.2	123.8	114.3
5 × 5 × 3	139.8	130.8	4.5	89.1	80.7	4.2	123.8	111.1
5 × 5 × 2½	139.8	130.8	4.5	76.3	67.9	4.2	123.8	108.0
5 × 5 × 2	139.8	130.8	4.5	60.5	52.9	3.8	123.8	104.8
6	165.2	155.2	5.0	165.2	155.2	5.0	142.9	142.9
6 × 6 × 5	165.2	155.2	5.0	139.8	130.8	4.5	142.9	136.5
6 × 6 × 4	165.2	155.2	5.0	114.3	105.3	4.5	142.9	130.2
6 × 6 × 3½	165.2	155.2	5.0	101.6	93.2	4.2	142.9	127.0
6 × 6 × 3	165.2	155.2	5.0	89.1	80.7	4.2	142.9	123.8
6 × 6 × 2½	165.2	155.2	5.0	76.3	67.9	4.2	142.9	120.7
8	216.3	204.7	5.8	216.3	204.7	5.8	177.8	177.8
8 × 8 × 6	216.3	204.7	5.8	165.2	155.2	5.0	177.8	168.3
8 × 8 × 5	216.3	204.7	5.8	139.8	130.8	4.5	177.8	161.9
8 × 8 × 4	216.3	204.7	5.8	114.3	105.3	4.5	177.8	155.6
10	267.4	254.2	6.6	267.4	254.2	6.6	215.9	215.9
10 × 10 × 8	267.4	254.2	6.6	216.3	204.7	5.8	215.9	203.2
10 × 10 × 6	267.4	254.2	6.6	165.2	155.2	5.0	215.9	193.7
10 × 10 × 5	267.4	254.2	6.6	139.8	130.8	4.5	215.9	190.5
12	318.5	304.7	6.9	318.5	304.7	6.9	254.0	254.0
12 × 12 × 10	318.5	304.7	6.9	267.4	254.2	6.6	254.0	241.3
12 × 12 × 8	318.5	304.7	6.9	216.3	204.7	5.8	254.0	228.6
12 × 12 × 6	318.5	304.7	6.9	165.2	155.2	5.0	254.0	219.1
14	355.6	339.8	7.9	355.6	339.8	7.9	279.4	279.4
14 × 14 × 12	355.6	339.8	7.9	318.5	304.7	6.9	279.4	269.9
14 × 14 × 10	355.6	339.8	7.9	267.4	254.2	6.6	279.4	257.2
14 × 14 × 8	355.6	339.8	7.9	216.3	204.7	5.8	279.4	247.7
16	406.4	390.6	7.9	406.4	390.6	7.9	304.8	304.8
16 × 16 × 14	406.4	390.6	7.9	355.6	339.8	7.9	304.8	304.8
16 × 16 × 14	406.4	390.6	7.9	318.5	304.7	6.9	304.8	295.3
16 × 16 × 10	406.4	390.6	7.9	267.4	254.2	6.6	304.8	282.6
18	457.2	441.4	7.9	457.2	441.4	7.9	342.9	342.9
18 × 18 × 16	457.2	441.4	7.9	406.4	390.6	7.9	342.9	330.2
18 × 18 × 14	457.2	441.4	7.9	355.6	339.8	7.9	342.9	330.2
18 × 18 × 12	457.2	441.4	7.9	318.5	304.7	6.9	342.9	320.7
20	508.0	492.2	7.9	508.0	492.2	7.9	381.0	381.0
20 × 20 × 18	508.0	492.2	7.9	457.2	441.4	7.9	381.0	368.0
20 × 20 × 16	508.0	492.2	7.9	406.4	390.6	7.9	381.0	355.6
20 × 20 × 14	508.0	492.2	7.9	355.6	339.8	7.9	381.0	355.6

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 124

Steel Butt - Weld Pipe Fittings

Reducers

SGP



KS B1522, JIS B2311

(in millimeters)

Nominal Pipe Size	Large End			Small End			H
	Outside Diameter OD ₁	Inside Diameter ID ₁	Wall Thickness T ₁	Outside Diameter OD ₂	Inside Diameter ID ₂	Wall Thickness T ₂	
3/4 × 1/2	27.2	21.6	2.8	21.7	16.1	2.8	38.1
1 × 3/4	34.0	27.6	3.2	27.2	21.6	2.8	50.8
1 × 1/2	34.0	27.6	3.2	21.7	16.1	2.8	50.8
1 1/4 × 1	42.7	35.7	3.5	34.0	27.6	3.2	50.8
1 1/4 × 3/4	42.7	35.7	3.5	27.2	21.6	2.8	50.8
1 1/4 × 1/2	42.7	35.7	3.5	21.7	16.1	2.8	50.8
1 1/2 × 1 1/4	48.6	41.6	3.5	42.7	35.7	3.5	63.5
1 1/2 × 1	48.6	41.6	3.5	34.0	27.6	3.2	63.5
1 1/2 × 3/4	48.6	41.6	3.5	27.2	21.6	2.8	63.5
2 × 1 1/2	60.5	52.9	3.8	48.6	41.6	3.5	76.2
2 × 1 1/4	60.5	52.9	3.8	42.7	35.7	3.5	76.2
2 × 1	60.5	52.9	3.8	34.0	27.6	3.2	76.2
2 × 3/4	60.5	52.9	3.8	27.2	21.6	2.8	76.2
2 1/2 × 2	76.3	67.9	4.2	60.5	52.9	3.8	88.9
2 1/2 × 1 1/2	76.3	67.9	4.2	48.6	41.6	3.5	88.9
2 1/2 × 1 1/4	76.3	67.9	4.2	42.7	35.7	3.5	88.9
2 1/2 × 1	76.3	67.9	4.2	34.0	27.6	3.2	88.9
3 × 2 1/2	89.1	80.7	4.2	76.3	67.9	4.2	88.9
3 × 2	89.1	80.7	4.2	60.5	52.9	3.8	88.9
3 × 1 1/2	89.1	80.7	4.2	48.6	41.6	3.5	88.9
3 × 1 1/4	89.1	80.7	4.2	42.7	35.7	3.5	88.9
3 1/2 × 3	101.6	93.2	4.2	89.1	80.7	4.2	101.6
3 1/2 × 2 1/2	101.6	93.2	4.2	76.3	67.9	4.2	101.6
3 1/2 × 2	101.6	93.2	4.2	60.5	52.9	3.8	101.6
3 1/2 × 1 1/2	101.6	93.2	4.2	48.6	41.6	3.5	101.6
4 × 3 1/2	114.3	105.3	4.5	101.6	93.2	4.2	101.6
4 × 3	114.3	105.3	4.5	89.1	80.7	4.2	101.6
4 × 2 1/2	114.3	105.3	4.5	76.3	67.9	4.2	101.6
4 × 2	114.3	105.3	4.5	60.5	52.9	3.8	101.6
5 × 4	139.8	130.8	4.5	114.3	105.3	4.5	127.0
5 × 3 1/2	139.8	130.8	4.5	101.6	93.2	4.2	127.0
5 × 3	139.8	130.8	4.5	89.1	80.7	4.2	127.0
5 × 2 1/2	139.8	130.8	4.5	76.3	67.9	4.2	127.0

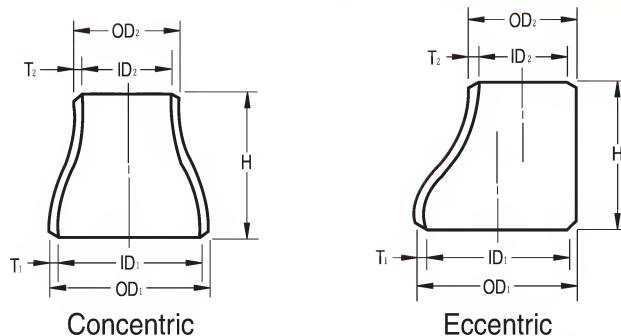
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 125

Steel Butt - Weld Pipe Fittings



Reducers

SPP . SGP



KS B1522, JIS B2311

(in millimeters)

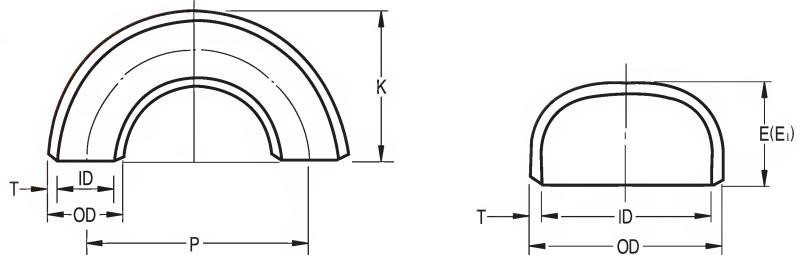
Nominal Pipe Size	Large End			Small End			H
	Outside Diameter OD_1	Inside Diameter ID_1	Wall Thickness T_1	Outside Diameter OD_2	Inside Diameter ID_2	Wall Thickness T_2	
6× 5	165.2	155.2	5.0	139.8	130.8	4.5	139.7
6× 4	165.2	155.2	5.0	114.3	105.3	4.5	139.7
6× 3½	165.2	155.2	5.0	101.6	93.2	4.2	139.7
6× 3	165.2	155.2	5.0	89.1	80.7	4.2	139.7
6× 2½	165.2	155.2	5.0	76.3	67.9	4.2	139.7
8× 6	216.3	204.7	5.8	165.2	155.2	5.0	152.4
8× 5	216.3	204.7	5.8	139.8	130.8	4.5	152.4
8× 4	216.3	204.7	5.8	114.3	105.3	4.5	152.4
8× 3½	216.3	204.7	5.8	101.6	93.2	4.2	152.4
10× 8	267.4	254.2	6.6	216.3	204.7	5.8	177.8
10× 6	267.4	254.2	6.6	165.2	155.2	5.0	177.8
10× 5	267.4	254.2	6.6	139.8	130.8	4.5	177.8
12×10	318.5	304.7	6.9	267.4	254.2	6.6	203.2
12× 8	318.5	304.7	6.9	216.3	204.7	5.8	203.2
12× 6	318.5	304.7	6.9	165.2	155.2	5.0	203.2
12× 5	318.5	304.7	6.9	139.8	130.8	4.5	203.2
14×12	355.6	339.8	7.9	318.5	304.7	6.9	330.2
14×10	355.6	339.8	7.9	267.4	254.2	6.6	330.2
14× 8	355.6	339.8	7.9	216.3	204.7	5.8	330.2
16×14	406.4	390.6	7.9	355.6	339.8	7.9	355.6
16×12	406.4	390.6	7.9	318.5	304.7	6.9	355.6
16×10	406.4	390.6	7.9	267.4	254.2	6.6	355.6
18×16	457.2	441.4	7.9	406.4	390.6	7.9	381.0
18×14	457.2	441.4	7.9	355.6	339.8	7.9	381.0
18×12	457.2	441.4	7.9	318.5	304.7	7.9	381.0
20×18	508.0	492.2	7.9	457.2	441.4	7.9	508.0
20×16	508.0	492.2	7.9	406.4	390.6	7.9	508.0
20×14	508.0	492.2	7.9	355.6	339.8	7.9	508.0

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 125

Steel Butt - Weld Pipe Fittings

180° Elbows (Long, Short) Caps

SPP . SGP



KS B1522, JIS B2311

(in millimeters)

Nominal Pipe Size	Outside Diameter OD	Inside Diameter ID	Wall Thickness T	E	Long		Short	
					P	K	P	K
1/2	21.7	16.1	2.8	—	76.2	49.0	—	—
3/4	27.2	21.6	2.8	—	76.2	51.7	—	—
1	34.0	27.6	3.2	38.1	76.2	55.1	50.8	42.4
1 1/4	42.7	35.7	3.5	38.1	95.2	69.0	63.6	53.2
1 1/2	48.6	41.6	3.5	38.1	114.4	81.5	76.2	62.4
2	60.5	52.9	3.8	38.1	152.4	106.5	101.6	81.1
2 1/2	76.3	67.9	4.2	38.1	190.6	133.5	127.0	101.7
3	89.1	80.7	4.2	50.8	228.6	158.9	152.4	120.8
3 1/2	101.6	93.2	4.2	63.5	266.8	184.2	177.8	139.7
4	114.3	105.3	4.5	63.5	304.8	209.6	203.2	158.8
5	139.8	130.8	4.5	76.2	381.0	260.4	254.0	196.9
6	165.2	155.2	5.0	88.9	457.2	311.2	304.8	235.0
8	216.3	204.7	5.8	101.6	609.6	413.0	406.4	311.4
10	267.4	254.2	6.6	127.0	762.0	514.7	508.0	387.7
12	318.5	304.7	6.9	152.4	914.4	616.5	609.6	464.0
14	355.6	339.8	7.9	165.1	1066.8	711.2	711.2	533.4
16	406.4	390.6	7.9	177.8	1219.2	812.8	812.8	609.6
18	457.2	441.4	7.9	203.2	—	—	—	—
20	508.0	492.2	7.9	228.6	—	—	—	—

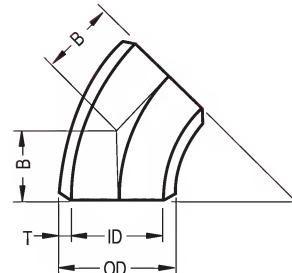
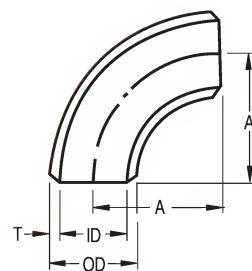
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 122

Steel Butt - Weld Pipe Fittings



90° Elbows(Long, Short)
45° Elbows(Long, Short)

Sch 40,80,120,160



KS B1541, JIS B2312

(in millimeters)

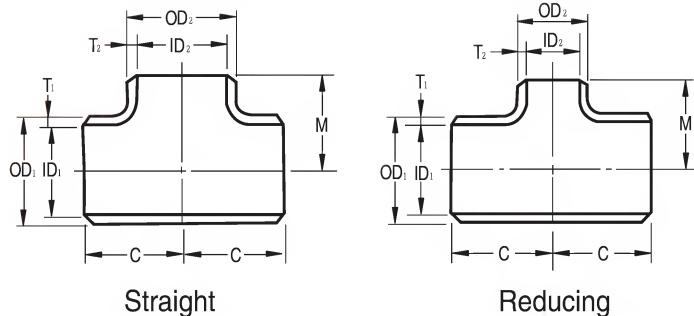
Nominal Pipe Size	Outside Diameter OD	Sch 40		Sch 80		Sch 120		Sch 160		Long		Short	
		ID	T	ID	T	ID	T	ID	T	A	B	A	B
1/2	21.7	16.1	2.8	14.3	3.7	—	—	—	—	38.1	15.8	—	—
5/8	27.2	21.4	2.9	19.4	3.9	—	—	—	—	38.1	15.8	—	—
1	34.0	27.2	3.4	25.0	4.5	—	—	—	—	38.1	15.8	25.4	—
1 1/4	42.7	35.5	3.6	32.9	4.9	—	—	—	—	47.6	19.7	31.8	13.2
1 1/2	48.6	41.2	3.7	38.4	5.1	—	—	34.4	7.1	57.2	23.7	38.1	15.8
2	60.5	52.7	3.9	49.5	5.5	—	—	43.1	8.7	76.2	31.6	50.8	21.0
2 1/2	76.3	65.9	5.2	62.3	7.0	—	—	57.3	9.5	95.3	39.5	63.5	26.3
3	89.1	78.1	5.5	73.9	7.6	—	—	66.9	11.1	114.3	47.3	76.2	31.6
3 1/2	101.6	90.2	5.7	85.4	8.1	—	—	76.2	12.7	133.4	55.3	88.9	36.8
4	114.3	102.3	6.0	97.1	8.6	92.1	11.1	87.3	13.5	152.4	63.1	101.6	42.1
5	139.8	126.6	6.6	120.8	9.5	114.4	12.7	108.0	15.9	190.5	78.9	127.0	52.6
6	165.2	151.0	7.1	143.2	11.0	136.6	14.3	128.8	18.2	228.6	94.7	152.4	63.1
8	216.3	199.9	8.2	190.9	12.7	179.9	18.2	170.3	23.0	304.8	126.2	203.2	84.2
10	267.4	248.8	9.3	237.2	15.1	224.6	21.4	210.2	28.6	381.0	157.8	254.0	105.2
12	318.5	297.9	10.3	283.7	17.4	267.7	25.4	251.9	33.3	457.2	189.4	304.8	126.2
14	355.6	333.4	11.1	317.6	19.0	300.0	27.8	284.2	35.7	533.4	220.9	355.6	147.3
16	406.4	381.0	12.7	363.6	21.4	344.6	30.9	325.4	40.5	609.6	252.5	406.4	168.3
18	457.2	428.6	14.3	409.6	23.8	387.4	34.9	—	—	685.8	284.1	457.2	189.4
20	508.0	477.8	15.1	455.6	26.2	431.8	38.1	—	—	762.0	315.6	508.0	210.4

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 122

Steel Butt - Weld Pipe Fittings

Tees

Sch 40,80,120,160



KS B1541, JIS B2312

(in millimeters)

Nominal Pipe Size	Outside Diameter		Wall Thickness T						C	M
	OD ₁	OD ₂	Sch 40		Sch 80		Sch 160			
			T ₁	T ₂	T ₁	T ₂	T ₁	T ₂		
1/2	21.7	21.7	2.8	2.8	3.7	3.7	—	—	25.4	25.4
3/4	27.2	27.2	2.9	2.9	3.9	3.9	—	—	28.6	28.6
3/4 × 3/4 × 1/2	27.2	21.7	2.9	2.8	3.9	3.7	—	—	28.6	28.6
1	34.0	34.0	3.4	3.4	4.5	4.5	—	—	38.1	38.1
1 × 1 × 3/4	34.0	27.2	3.4	2.9	4.5	3.9	—	—	38.1	38.1
1 × 1 × 1/2	34.0	21.7	3.4	2.8	4.5	3.7	—	—	38.1	38.1
1 1/4	42.7	42.7	3.6	3.6	4.9	4.9	—	—	47.6	47.6
1 1/4 × 1 1/4 × 1	42.7	34.0	3.6	3.4	4.9	4.5	—	—	47.6	47.6
1 1/4 × 1 1/4 × 3/4	42.7	27.2	3.6	2.9	4.9	3.9	—	—	47.6	47.6
1 1/2	48.6	48.6	3.7	3.7	5.1	5.1	7.1	7.1	57.2	57.2
1 1/2 × 1 1/2 × 1 1/4	48.6	42.7	3.7	3.6	5.1	4.9	—	—	57.2	57.2
1 1/2 × 1 1/2 × 1	48.6	34.0	3.7	3.4	5.1	4.5	—	—	57.2	57.2
1 1/2 × 1 1/2 × 3/4	48.6	27.2	3.7	2.9	5.1	3.9	—	—	57.2	57.2
2	60.5	60.5	3.9	3.9	5.5	5.5	8.7	8.7	63.5	63.5
2 × 2 × 1 1/2	60.5	48.6	3.9	3.7	5.5	5.1	8.7	7.1	63.5	60.3
2 × 2 × 1 1/4	60.5	42.7	3.9	3.6	5.5	4.9	—	—	63.5	57.2
2 × 2 × 1	60.5	34.0	3.9	3.4	5.5	4.5	—	—	63.5	50.8
2 1/2	76.3	76.3	5.5	5.2	7.0	7.0	9.5	9.5	76.2	76.2
2 1/2 × 2 1/2 × 2	76.3	60.5	5.2	3.9	7.0	5.5	9.5	8.7	76.2	69.6
2 1/2 × 2 1/2 × 1 1/2	76.3	48.6	5.2	3.7	7.0	5.1	9.5	7.1	76.2	66.7
2 1/2 × 2 1/2 × 1 1/4	76.3	42.7	5.2	3.6	7.0	4.9	—	—	76.2	63.5
3	89.1	89.1	5.5	5.5	7.6	7.6	11.1	11.1	85.7	85.7
3 × 3 × 2 1/2	89.1	76.3	5.5	5.2	7.6	7.0	11.1	9.5	85.7	82.6
3 × 3 × 2	89.1	60.5	5.5	3.9	7.6	5.5	11.1	8.7	85.7	76.2
3 × 3 × 1 1/2	89.1	48.6	5.5	3.7	7.6	5.1	11.1	7.1	85.7	73.0
3 1/2	101.6	101.6	5.7	5.7	8.1	8.1	12.7	12.7	95.3	95.3
3 1/2 × 3 1/2 × 3	101.6	89.1	5.7	5.5	8.1	7.6	12.7	11.1	95.3	92.1
3 1/2 × 3 1/2 × 2 1/2	101.6	76.3	5.7	5.2	8.1	7.0	12.7	9.5	95.3	88.9
3 1/2 × 3 1/2 × 2	101.6	60.5	5.7	3.9	8.1	5.5	12.7	8.7	95.3	82.6
3 1/2 × 3 1/2 × 1 1/2	101.6	48.6	5.7	3.7	8.1	5.1	12.7	7.1	95.3	79.4
4	114.3	114.3	6.0	6.0	8.6	8.6	13.5	13.5	104.8	104.8
4 × 4 × 3 1/2	114.3	101.6	6.0	5.7	8.6	8.1	13.5	12.7	104.8	101.6
4 × 4 × 3	114.3	89.1	6.0	5.5	8.6	7.6	13.5	11.1	104.8	98.4
4 × 4 × 2 1/2	114.3	76.3	6.0	5.2	8.6	7.0	13.5	9.5	104.8	95.3
4 × 4 × 2	114.3	60.5	6.0	3.9	8.6	5.5	13.5	8.7	104.8	88.9

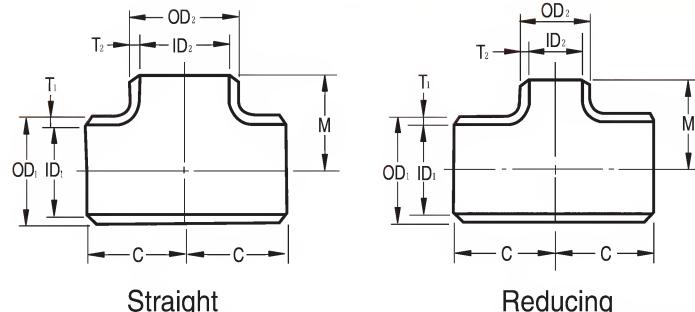
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 124

Steel Butt - Weld Pipe Fittings



Tees

Sch 40,80,120,160



KS B1541, JIS B2312

(in millimeters)

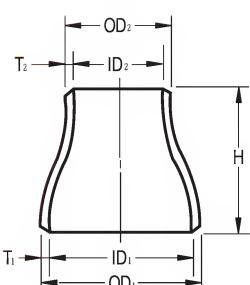
Nominal Pipe Size	Outside Diameter		Wall Thickness T								C	M
	OD ₁	OD ₂	Sch 40		Sch 80		Sch 120		Sch 160			
			T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂		
5	139.8	139.8	6.6	6.6	9.5	9.5	12.7	12.7	15.9	15.9	123.8	123.8
5×5×4	139.8	114.3	6.6	6.0	9.5	8.6	12.7	11.1	15.9	13.5	123.8	117.5
5×5×3½	139.8	101.6	6.6	5.7	9.5	8.1	—	—	15.9	12.7	123.8	114.3
5×5×3	139.8	89.1	6.6	5.5	9.5	7.6	—	—	15.9	11.1	123.8	111.1
5×5×2½	139.8	76.3	6.6	5.2	9.5	7.0	—	—	15.9	9.5	123.8	108.0
6	165.2	165.2	7.1	7.1	11.0	11.0	14.3	14.3	18.2	18.2	142.9	142.9
6×6×5	165.2	139.8	7.1	6.6	11.0	9.5	14.3	12.7	18.2	15.9	142.9	136.5
6×6×4	165.2	114.3	7.1	6.0	11.0	8.6	14.3	11.1	18.2	13.5	142.9	130.2
6×6×3½	165.2	101.6	7.1	5.7	11.0	8.1	—	—	18.2	12.7	142.9	127.0
6×6×3	165.2	89.1	7.1	5.5	11.0	7.6	—	—	18.2	11.1	142.9	123.8
8	216.3	216.3	8.2	8.2	12.7	12.7	18.2	18.2	23.0	23.0	177.8	177.8
8×8×6	216.3	165.2	8.2	7.1	12.7	11.0	18.2	14.3	23.0	18.2	177.8	168.3
8×8×5	216.3	139.8	8.2	6.6	12.7	9.5	18.2	12.7	23.0	15.9	177.8	161.9
8×8×4	216.3	114.3	8.2	6.0	12.7	8.6	18.2	11.1	23.0	13.5	177.8	155.6
10	267.4	267.4	9.3	9.3	15.1	15.1	21.4	21.4	28.6	28.6	215.9	215.9
10×10×8	267.4	216.3	9.3	8.2	15.1	12.7	21.4	18.2	28.6	23.0	215.9	203.2
10×10×6	267.4	165.2	9.3	7.1	15.1	11.0	21.4	14.3	28.6	18.2	215.9	193.7
10×10×5	267.4	139.8	9.3	6.6	15.1	9.5	21.4	12.7	28.6	15.9	215.9	190.5
12	318.5	318.5	10.3	10.3	17.4	17.4	25.4	25.4	33.3	33.3	254.0	254.0
12×12×10	318.5	267.4	10.3	9.3	17.4	15.1	25.4	21.4	33.3	28.6	254.0	241.3
12×12×8	318.5	216.3	10.3	8.2	17.4	12.7	25.4	18.2	33.3	23.0	254.0	228.6
12×12×6	318.5	165.2	10.3	7.1	17.4	11.0	25.4	14.3	33.3	18.2	254.0	219.1
14	355.6	355.6	11.1	11.1	19.0	19.0	27.8	27.8	35.7	35.7	279.4	279.4
14×14×12	355.6	318.5	11.1	10.3	19.0	17.4	27.8	25.4	35.7	33.3	279.4	269.9
14×14×10	355.6	267.4	11.1	9.3	19.0	15.1	27.8	21.4	35.7	28.6	279.4	257.2
14×14×8	355.6	216.3	11.1	8.2	19.0	12.7	27.8	18.2	35.7	23.0	279.4	247.7
16	406.4	406.3	12.7	12.7	21.4	21.4	30.9	30.9	40.5	40.5	304.8	304.8
16×16×14	406.4	355.6	12.7	10.3	21.4	19.0	30.9	27.8	40.5	35.7	304.8	304.8
16×16×12	406.4	318.5	12.7	10.3	21.4	17.4	30.9	25.4	40.5	33.3	304.8	295.3
16×16×10	406.4	267.4	12.7	9.3	21.4	15.1	30.9	21.4	40.5	28.6	304.8	282.6
18	457.2	457.2	14.3	14.3	23.8	23.8	34.9	34.9	—	—	342.9	342.9
18×18×16	457.2	406.4	14.3	12.7	23.8	21.4	34.9	30.9	—	—	342.9	330.2
18×18×14	457.2	355.6	14.3	11.1	23.8	19.0	34.9	27.8	—	—	342.9	330.2
18×18×12	457.2	318.5	14.3	10.3	23.8	17.4	34.9	25.4	—	—	342.9	320.7
20	508.0	508.0	15.1	15.1	26.2	26.2	38.1	38.1	—	—	381.0	381.0
20×20×18	508.0	457.2	15.1	14.3	26.2	23.8	38.1	34.9	—	—	381.0	368.0
20×20×16	508.0	406.4	15.1	12.7	26.2	21.4	38.1	30.9	—	—	381.0	355.6
20×20×14	508.0	355.6	15.1	11.1	26.2	19.0	38.1	27.8	—	—	381.0	355.6

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 124

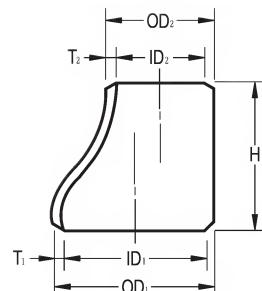
Steel Butt - Weld Pipe Fittings

Reducers

Sch 40,80,160



Concentric



Eccentric

KS B1541, JIS B2312

(in millimeters)

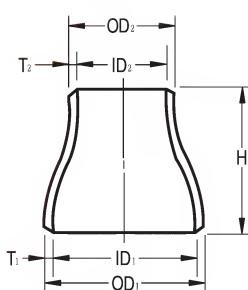
Nominal Pipe Size	Outside Diameter		Wall Thickness T						H
			Sch 40		Sch 80		Sch 160		
	OD ₁	OD ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
3/4 × 1/2	27.2	21.7	2.9	2.8	3.9	3.7	—	—	38.1
1 × 3/4	34.0	27.2	3.4	2.9	4.5	3.9	—	—	50.8
1 × 1/2	34.0	21.7	3.4	2.9	4.5	3.7	—	—	50.8
1 1/4 × 1	42.7	34.0	3.6	3.4	4.9	4.5	—	—	50.8
1 1/4 × 3/4	42.7	27.2	3.6	2.9	4.9	3.9	—	—	50.8
1 1/4 × 1/2	42.7	21.7	3.6	2.8	4.9	3.7	—	—	50.8
1 1/2 × 1 1/4	48.6	42.7	3.7	3.6	5.1	4.9	—	—	63.5
1 1/2 × 1	48.6	34.0	3.7	3.4	5.1	4.5	—	—	63.5
1 1/2 × 3/4	48.6	27.2	3.7	2.9	5.1	3.9	—	—	63.5
2 × 1 1/2	60.5	48.6	3.9	3.7	5.5	5.1	8.7	7.1	76.2
2 × 1 1/4	60.5	42.7	3.9	3.6	5.5	4.9	—	—	76.2
2 × 1	60.5	34.0	3.9	3.4	5.5	4.5	—	—	76.2
2 × 3/4	60.5	27.2	3.9	2.9	5.5	3.9	—	—	76.2
2 1/2 × 2	76.3	60.5	5.2	3.9	7.0	5.5	9.5	8.7	88.9
2 1/2 × 1 1/2	76.3	48.6	5.2	3.7	7.0	5.1	9.5	7.1	88.9
2 1/2 × 1 1/4	76.3	42.7	5.2	3.6	7.0	4.9	—	—	88.9
2 1/2 × 1	76.3	34.0	5.2	3.4	7.0	4.5	—	—	88.9
3 × 2 1/2	89.1	76.3	5.5	5.2	7.6	7.0	11.1	9.5	88.9
3 × 2	89.1	60.5	5.5	3.9	7.6	5.5	11.1	8.7	88.9
3 × 1 1/2	89.1	48.6	5.5	3.7	7.6	5.1	11.1	7.1	88.9
3 × 1 1/4	89.1	42.7	5.5	3.6	7.6	4.9	—	—	88.9
3 1/2 × 3	101.6	89.1	5.7	5.5	8.1	7.6	12.7	11.1	101.6
3 1/2 × 2 1/2	101.6	76.3	5.7	5.2	8.1	7.0	12.7	9.5	101.6
3 1/2 × 2	101.6	60.5	5.7	3.9	8.1	5.5	12.7	8.7	101.6
3 1/2 × 1 1/2	101.6	48.6	5.7	3.7	8.1	5.1	12.7	7.1	101.6
4 × 3 1/2	114.3	101.6	6.0	5.7	8.6	8.1	13.5	12.7	101.6
4 × 3	114.3	89.1	6.0	5.5	8.6	7.6	13.5	11.1	101.6
4 × 2 1/2	114.3	76.3	6.0	5.2	8.6	7.0	13.5	9.5	101.6
4 × 2	114.3	60.5	6.0	3.9	8.6	5.5	13.5	8.7	101.6
4 × 1 1/2	114.3	48.6	6.0	3.7	8.6	5.1	13.5	7.1	101.6

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 125

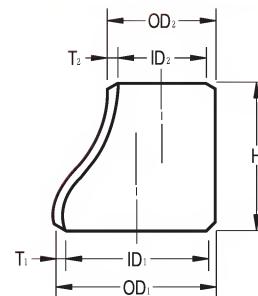


Reducers

Sch 40,80,120,160



Concentric



Eccentric

KS B1541, JIS B2312

(in millimeters)

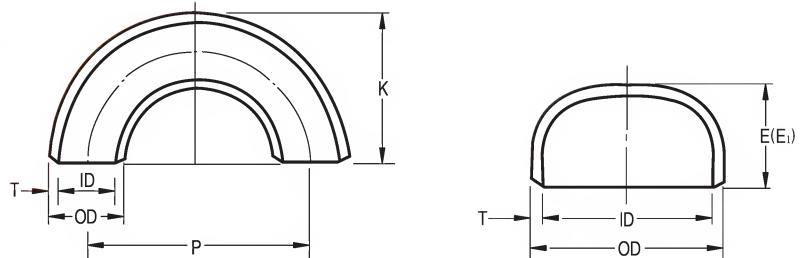
Nominal Pipe Size	Outside Diameter		Wall Thickness T								H
	OD ₁	OD ₂	Sch 40		Sch 80		Sch 120		Sch 160		
			T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
5× 4	139.8	114.3	6.6	6.0	9.5	8.6	12.7	11.1	15.9	13.5	127.0
5× 3	139.8	101.6	6.6	5.7	9.5	8.1	—	—	15.9	12.7	127.0
5× 3	139.8	89.1	6.6	5.5	9.5	7.6	—	—	15.9	11.1	127.0
5× 2	139.8	76.3	6.6	5.2	9.5	7.0	—	—	15.9	9.5	127.0
6× 5	165.2	139.8	7.1	6.6	11.0	9.5	14.3	12.7	18.2	15.9	139.7
6× 4	165.2	114.3	7.1	6.0	11.0	8.6	14.3	11.1	18.2	13.5	139.7
6× 3	165.2	101.6	7.1	5.7	11.0	8.1	—	—	18.2	12.7	139.7
6× 3	165.2	89.1	7.1	5.5	11.0	7.6	—	—	18.2	11.1	139.7
6× 2	165.2	76.3	7.1	5.2	11.0	7.0	—	—	18.2	9.5	139.7
8× 6	216.3	165.2	8.2	7.1	12.7	11.0	18.2	14.3	23.0	18.2	152.4
8× 5	216.3	139.8	8.2	6.6	12.7	9.5	18.2	12.7	23.0	15.9	152.4
8× 4	216.3	114.3	8.2	6.0	12.7	8.6	18.2	11.1	23.0	13.5	152.4
8× 3	216.3	101.6	8.2	5.7	12.7	8.1	—	—	23.0	12.7	152.4
10× 8	267.4	216.3	9.3	8.2	15.1	12.7	21.4	18.2	28.6	23.0	177.8
10× 6	267.4	165.2	9.3	7.1	15.1	11.0	21.4	14.3	28.6	18.2	177.8
10× 5	267.4	139.7	9.3	6.6	15.1	9.5	21.4	12.7	28.6	15.9	177.8
10× 4	267.4	114.3	9.3	6.0	15.1	8.6	—	—	28.6	13.5	177.8
12×10	318.5	267.4	10.3	9.3	17.4	15.1	25.4	21.4	33.3	28.6	203.2
12× 8	318.5	216.3	10.3	8.2	17.4	12.7	25.4	18.2	33.3	23.0	203.2
12× 6	318.5	165.2	10.3	7.1	17.4	11.0	25.4	14.3	33.3	18.2	203.2
12× 5	318.5	139.7	10.3	6.6	17.4	9.5	25.4	12.7	33.3	15.9	203.2
14×12	355.6	318.5	11.1	10.3	19.0	17.4	27.8	25.4	35.7	33.3	330.2
14×10	355.6	267.4	11.1	9.3	19.0	15.1	27.8	21.4	35.7	28.6	330.2
14× 8	355.6	216.3	11.1	8.2	19.0	12.7	27.8	18.2	35.7	23.0	330.2
16×14	406.4	355.6	12.7	11.1	21.4	19.0	30.9	27.8	40.5	35.7	355.6
16×12	406.4	318.5	12.7	10.3	21.4	17.4	30.9	25.4	40.5	33.3	355.6
16×10	406.4	267.4	12.7	9.3	21.4	15.1	30.9	21.4	40.5	28.6	355.6
18×16	457.2	406.4	14.3	12.7	23.8	21.4	34.9	30.9	—	—	381.0
18×14	457.2	355.6	14.3	11.1	23.8	19.0	34.9	27.8	—	—	381.0
18×12	457.2	318.5	14.3	10.3	23.8	17.4	34.9	25.4	—	—	381.0
20×18	508.0	457.2	15.1	14.3	26.2	23.8	38.1	34.9	—	—	508.0
20×16	508.0	406.4	15.1	12.7	26.2	21.4	38.1	30.9	—	—	508.0
20×14	508.0	355.6	15.1	11.1	26.2	19.0	38.1	27.8	—	—	508.0

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 125

Steel Butt - Weld Pipe Fittings

180° Elbows (Long, Short) Caps

Sch 40, 80, 120, 160



KS B1541, JIS B2312

(in millimeters)

Nominal Pipe Size	Outside Diameter OD	Wall Thickness T				E	E ₁	Limited Wall thickness	Long		Short	
		Sch 40	Sch 80	Sch 120	Sch 160				P	K	P	K
1/2	21.7	2.8	3.7	—	—	25.4	—	—	76.2	49.0	—	—
3/4	27.2	2.9	3.9	—	—	25.4	—	—	76.2	51.7	—	—
1	34.0	3.4	4.5	—	—	38.1	—	—	76.2	55.1	50.8	42.4
1 1/4	42.7	3.6	4.9	—	—	38.1	—	—	95.2	69.0	63.6	53.2
1 1/2	48.6	3.7	5.1	—	7.1	38.1	38.1	5.1	114.4	81.5	76.2	62.4
2	60.5	3.9	5.5	—	8.7	38.1	44.5	5.5	152.4	106.5	101.6	81.1
2 1/2	76.3	5.2	7.0	—	9.5	38.1	50.8	7.0	190.6	133.5	127.0	101.7
3	89.1	5.5	7.6	—	11.1	50.8	63.5	7.6	228.6	158.9	152.4	120.8
3 1/2	101.6	5.7	8.1	—	12.7	63.5	76.2	8.1	266.8	184.2	177.8	139.7
4	114.3	6.0	8.6	11.1	13.5	63.5	76.2	8.6	304.8	209.6	203.2	158.8
5	139.8	6.6	9.5	12.7	15.9	76.2	88.9	9.5	381.0	260.4	254.0	196.9
6	165.2	7.1	11.0	14.3	18.2	88.9	101.6	11.0	457.2	311.2	304.8	235.0
8	216.3	8.2	12.7	18.2	23.0	101.6	127.0	12.7	609.6	413.0	406.4	311.4
10	267.4	9.3	15.1	21.4	28.6	127.0	152.4	12.7	762.0	514.7	508.0	387.7
12	318.5	10.3	17.4	25.4	33.3	152.4	177.8	12.7	914.4	616.5	609.6	464.1
14	355.6	11.1	19.0	27.8	35.7	165.1	190.5	12.7	1066.8	711.2	711.2	533.4
16	406.4	12.7	21.4	30.9	40.5	177.8	203.2	12.7	1219.2	812.8	812.8	609.6
18	457.2	14.3	23.8	34.9	45.2	203.2	228.6	12.7	1371.6	914.4	914.4	685.8
20	508.0	15.1	26.2	38.1	50.0	228.6	254.0	12.7	1524.0	1016.0	1016.0	762.0

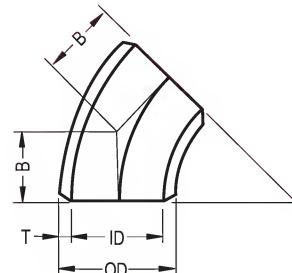
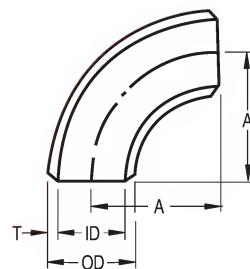
- The Back-To-Face Dimension of Cap Shall Be E, If The Basic Wall Thickness is Not More Than The "Limited Wall Thickness" And E₁ If It Exceeds The "Limited Wall Thickness"
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116
- For Approx Weight See Page 122

Steel Plate Butt - Weld Fittings



90° Elbows(Long, Short)
45° Elbows(Long, Short)

7.9T, STD, XS



KS B1522/43, JIS B2311/3

(in millimeters)

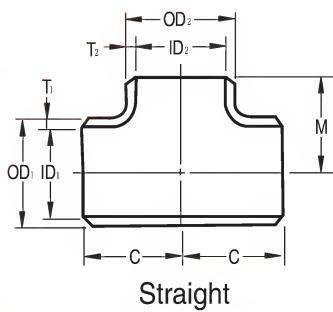
Nominal Pipe Size	Outside Diameter OD	Wall Thickness T								Center to Center			
		7.9T		STD		XS		Long		Short			
		ID	T	ID	T	ID	T	A	B	A	B		
14	355.6	339.8	7.9	336.6	9.5	330.2	12.7	533.4	220.9	355.6	147.3		
16	406.4	390.6	7.9	387.4	9.5	381.0	12.7	609.6	252.5	406.4	168.3		
18	457.2	441.4	7.9	438.2	9.5	431.8	12.7	685.8	284.1	457.2	189.4		
20	508.0	492.2	7.9	489.0	9.5	482.6	12.7	762.0	315.6	508.0	210.4		
22	558.8	543.0	7.9	539.8	9.5	533.4	12.7	838.2	347.2	558.8	231.5		
24	609.6	593.8	7.9	590.6	9.5	584.2	12.7	914.4	378.7	609.6	252.5		
26	660.4	644.6	7.9	641.4	9.5	635.0	12.7	990.6	410.3	660.4	273.5		
28	711.2	695.4	7.9	692.2	9.5	685.8	12.7	1066.8	441.9	711.2	294.6		
30	762.0	746.2	7.9	743.0	9.5	736.6	12.7	1143.0	473.4	762.0	315.6		
32	812.8	797.0	7.9	793.8	9.5	787.4	12.7	1219.2	505.0	812.8	336.7		
34	863.6	847.8	7.9	844.6	9.5	838.2	12.7	1295.4	536.6	863.6	357.7		
36	914.4	898.6	7.9	895.4	9.5	889.0	12.7	1371.6	568.1	914.4	378.7		
38	965.2	949.4	7.9	946.2	9.5	939.8	12.7	1447.8	599.7	965.2	—		
40	1016.0	1000.2	7.9	997.0	9.5	990.6	12.7	1524.0	631.2	1016.0	420.8		
42	1066.8	1051.0	7.9	1047.8	9.5	1041.4	12.7	1600.2	662.8	1066.8	—		
44	1117.6	1101.8	7.9	1098.6	9.5	1092.2	12.7	1676.4	694.4	1117.6	462.9		
46	1168.4	1152.6	7.9	1149.4	9.5	1143.0	12.7	1752.6	725.9	1168.4	—		
48	1219.2	1203.4	7.9	1200.2	9.5	1193.8	12.7	1828.8	757.5	1219.2	505.0		

- For Bevel Details See Page 119
- For Dimensional Tolerances See Page 117
- For Approx Weight See Page 122

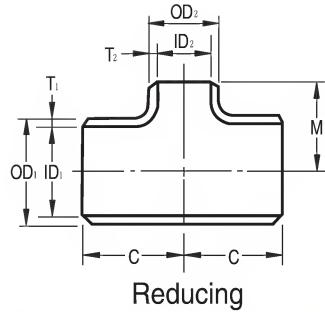
Steel Plate Butt - Weld Fittings

Tees

7.9T, STD, XS



Straight



Reducing

KS B1522/43, JIS B2311/3

(in millimeters)

Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	Wall Thickness T			C	M
			7.9T	STD	XS		
16	406.4	406.4	7.9	9.5	12.7	304.8	304.8
16×16×14	406.4	355.6	7.9	9.5	12.7	304.8	304.8
16×16×12	406.4	318.5	7.9	9.5	12.7	304.8	295.3
16×16×10	406.4	267.4	7.9	9.5	12.7	304.8	282.6
18	457.2	457.2	7.9	9.5	12.7	342.9	342.9
18×18×16	457.2	406.4	7.9	9.5	12.7	342.9	330.2
18×18×14	457.2	355.6	7.9	9.5	12.7	342.9	330.2
18×18×12	457.2	318.5	7.9	9.5	12.7	342.9	330.2
20	508.0	508.0	7.9	9.5	12.7	381.0	381.0
20×20×18	508.0	457.2	7.9	9.5	12.7	381.0	368.0
20×20×16	508.0	406.4	7.9	9.5	12.7	381.0	355.6
20×20×14	508.0	355.6	7.9	9.5	12.7	381.0	355.6
22	558.8	558.8	7.9	9.5	12.7	419.1	419.1
22×22×20	558.8	508.0	7.9	9.5	12.7	419.1	406.4
22×22×18	558.8	457.2	7.9	9.5	12.7	419.1	393.7
22×22×16	558.8	406.4	7.9	9.5	12.7	419.1	381.0
24	609.6	609.6	7.9	9.5	12.7	431.8	431.8
24×24×22	609.6	558.8	7.9	9.5	12.7	431.8	431.8
24×24×20	609.6	508.0	7.9	9.5	12.7	431.8	431.8
24×24×18	609.6	457.2	7.9	9.5	12.7	431.8	419.1
26	660.4	660.4	7.9	9.5	12.7	495.3	495.3
26×26×24	660.4	609.6	7.9	9.5	12.7	495.3	482.6
26×26×22	660.4	558.8	7.9	9.5	12.7	495.3	469.9
26×26×20	660.4	508.0	7.9	9.5	12.7	495.3	457.2
28	711.2	711.2	7.9	9.5	12.7	520.7	520.7
28×28×26	711.2	660.4	7.9	9.5	12.7	520.7	520.7
28×28×24	711.2	609.6	7.9	9.5	12.7	520.7	508.0
28×28×22	711.2	558.8	7.9	9.5	12.7	520.7	495.3
30	762.0	762.0	7.9	9.5	12.7	558.8	558.8
30×30×28	762.0	711.2	7.9	9.5	12.7	558.8	546.1
30×30×26	762.0	660.4	7.9	9.5	12.7	558.8	546.1
30×30×24	762.0	609.6	7.9	9.5	12.7	558.8	533.4

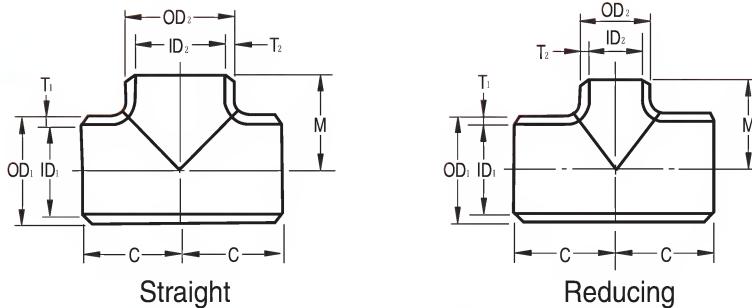
- For Bevel Details See Page 119
- For Dimensional Tolerances See Page 117
- For Approx Weight See Page 124

Steel Plate Butt - Weld Fittings



Tees

7.9T, STD, XS



KS B1522/43, JIS B2311/3

(in millimeters)

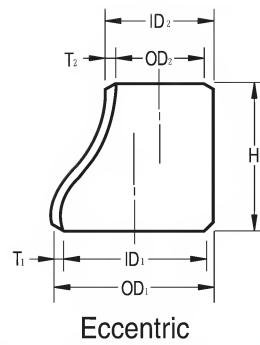
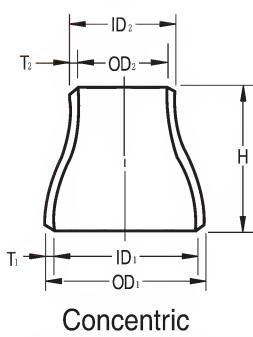
Nominal Pipe Size	Outside Diameter OD ₁	Outside Diameter OD ₂	Wall Thickness T			C	M
			7.9T	STD	XS		
32	812.8	812.8	7.9	9.5	12.7	596.9	596.9
32×32×30	812.8	762.0	7.9	9.5	12.7	596.9	584.2
32×32×28	812.8	711.2	7.9	9.5	12.7	596.9	571.5
32×32×26	812.8	660.4	7.9	9.5	12.7	596.9	571.5
34	863.6	863.6	7.9	9.5	12.7	635.0	635.0
34×34×32	863.6	812.8	7.9	9.5	12.7	635.0	622.3
34×34×30	863.6	762.0	7.9	9.5	12.7	635.0	609.6
34×34×28	863.6	711.2	7.9	9.5	12.7	635.0	596.9
36	914.4	914.4	7.9	9.5	12.7	673.1	673.1
36×36×34	914.4	863.6	7.9	9.5	12.7	673.1	660.4
36×36×32	914.4	812.8	7.9	9.5	12.7	673.1	647.7
36×36×30	914.4	762.0	7.9	9.5	12.7	673.1	635.0
38	965.2	965.2	7.9	9.5	12.7	711.2	711.2
38×38×36	965.2	914.4	7.9	9.5	12.7	711.2	711.2
38×38×34	965.2	863.6	7.9	9.5	12.7	711.2	698.5
38×38×32	965.2	812.8	7.9	9.5	12.7	711.2	685.8
40	1016.0	1016.0	7.9	9.5	12.7	749.3	749.3
40×40×38	1016.0	965.2	7.9	9.5	12.7	749.3	749.3
40×40×36	1016.0	914.4	7.9	9.5	12.7	749.3	736.6
40×40×34	1016.0	863.6	7.9	9.5	12.7	749.3	723.9
42	1066.8	1066.8	7.9	9.5	12.7	762.0	711.2
42×42×40	1066.9	1016.0	7.9	9.5	12.7	762.0	711.2
42×42×38	1066.8	965.2	7.9	9.5	12.7	762.0	711.2
42×42×36	1066.8	914.4	7.9	9.5	12.7	762.0	711.2
44	1117.6	1117.6	7.9	9.5	12.7	812.8	762.0
44×44×42	1117.6	1066.8	7.9	9.5	12.7	812.8	762.0
44×44×40	1117.6	1016.0	7.9	9.5	12.7	812.8	749.3
44×44×38	1117.6	965.2	7.9	9.5	12.7	812.8	736.6
46	1168.4	1168.4	7.9	9.5	12.7	850.9	800.1
46×46×44	1168.4	1117.6	7.9	9.5	12.7	850.9	800.1
46×46×42	1168.4	1066.8	7.9	9.5	12.7	850.9	787.4
46×46×40	1168.4	1016.0	7.9	9.5	12.7	850.9	774.8
48	1219.2	1219.2	7.9	9.5	12.7	889.0	838.2
48×48×46	1219.2	1168.4	7.9	9.5	12.7	889.0	838.2
48×48×44	1219.2	1117.6	7.9	9.5	12.7	889.0	838.2
48×48×42	1219.2	1066.8	7.9	9.5	12.7	889.0	812.8

- For Bevel Details See Page 119
- For Dimensional Tolerances See Page 117
- For Approx Weight See Page 124

Steel Plate Butt - Weld Fittings

Reducers

7.9T, STD, XS



KS B1522/43, JIS B2311/3

(in millimeters)

Nominal Pipe Size	Outside Diameter		Wall Thickness T			H
	OD ₁	OD ₂	7.9T	STD	XS	
16×14	406.4	355.6	7.9	9.5	12.7	355.6
16×12	406.4	318.5	7.9	9.5	12.7	355.6
16×10	406.4	267.4	7.9	9.5	12.7	355.6
16×8	406.4	216.3	7.9	9.5	12.7	355.6
18×16	457.2	406.4	7.9	9.5	12.7	381.0
18×14	457.2	355.6	7.9	9.5	12.7	381.0
18×12	457.2	318.5	7.9	9.5	12.7	381.0
18×10	457.2	267.4	7.9	9.5	12.7	381.0
20×18	508.0	457.2	7.9	9.5	12.7	508.0
20×16	508.0	406.4	7.9	9.5	12.7	508.0
20×14	508.0	355.6	7.9	9.5	12.7	508.0
20×12	508.0	318.5	7.9	9.5	12.7	508.0
22×20	558.8	508.0	7.9	9.5	12.7	508.0
22×18	558.8	457.2	7.9	9.5	12.7	508.0
22×16	558.8	406.4	7.9	9.5	12.7	508.0
22×14	558.8	355.6	7.9	9.5	12.7	508.0
24×22	609.6	558.8	7.9	9.5	12.7	508.0
24×20	609.6	508.0	7.9	9.5	12.7	508.0
24×18	609.6	457.2	7.9	9.5	12.7	508.0
24×16	609.6	406.4	7.9	9.5	12.7	508.0
26×24	660.4	609.6	7.9	9.5	12.7	609.6
26×22	660.4	558.8	7.9	9.5	12.7	609.6
26×20	660.4	508.0	7.9	9.5	12.7	609.6
26×18	660.4	457.2	7.9	9.5	12.7	609.6
28×26	711.2	660.4	7.9	9.5	12.7	609.6
28×24	711.2	609.6	7.9	9.5	12.7	609.6
28×22	711.2	558.8	7.9	9.5	12.7	609.6
28×20	711.2	508.0	7.9	9.5	12.7	609.6
30×28	762.0	711.2	7.9	9.5	12.7	609.6
30×26	762.0	660.4	7.9	9.5	12.7	609.6
30×24	762.0	609.6	7.9	9.5	12.7	609.6
30×22	762.0	558.8	7.9	9.5	12.7	609.6

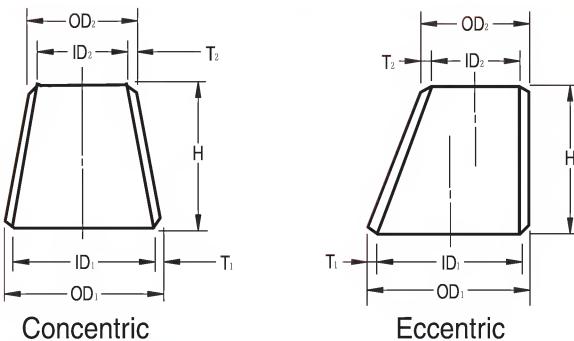
- For Bevel Details See Page 119
- For Dimensional Tolerances See Page 117
- For Approx Weight See Page 125

Steel Plate Butt - Weld Fittings



Reducers

7.9T, STD, XS



KS B1522/43, JIS B2311/3

(in millimeters)

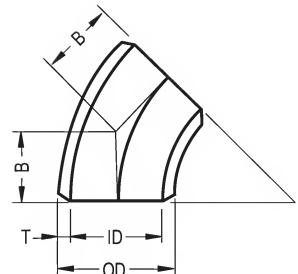
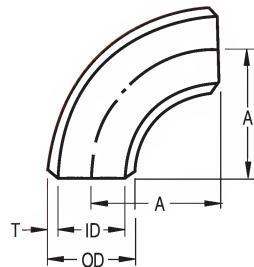
Nominal Pipe Size	Outside Diameter		Wall Thickness T			H
	OD ₁	OD ₂	7.9T	STD	XS	
32×30	812.8	762.0	7.9	9.5	12.7	609.6
32×28	812.8	711.2	7.9	9.5	12.7	609.6
32×26	812.8	660.4	7.9	9.5	12.7	609.6
32×24	812.8	609.6	7.9	9.5	12.7	609.6
34×32	863.6	812.8	7.9	9.5	12.7	609.6
34×30	863.6	762.0	7.9	9.5	12.7	609.6
34×28	863.6	711.2	7.9	9.5	12.7	609.6
34×26	863.6	660.4	7.9	9.5	12.7	609.6
36×34	914.4	863.6	7.9	9.5	12.7	609.6
36×32	914.4	812.8	7.9	9.5	12.7	609.6
36×30	914.4	762.0	7.9	9.5	12.7	609.6
36×28	914.4	711.2	7.9	9.5	12.7	609.6
38×36	965.2	914.4	7.9	9.5	12.7	609.6
38×34	965.2	863.6	7.9	9.5	12.7	609.6
38×32	965.2	812.8	7.9	9.5	12.7	609.6
38×30	965.2	762.0	7.9	9.5	12.7	609.6
40×38	1016.0	965.2	7.9	9.5	12.7	609.6
40×36	1016.0	914.4	7.9	9.5	12.7	609.6
40×34	1016.0	863.6	7.9	9.5	12.7	609.6
40×32	1016.0	812.8	7.9	9.5	12.7	609.6
42×40	1066.8	1016.0	7.9	9.5	12.7	609.6
42×38	1066.8	965.2	7.9	9.5	12.7	609.6
42×36	1066.8	914.4	7.9	9.5	12.7	609.6
42×34	1066.8	863.6	7.9	9.5	12.7	609.6
44×42	1117.6	1066.8	7.9	9.5	12.7	609.6
44×40	1117.6	1016.0	7.9	9.5	12.7	609.6
44×38	1117.6	965.2	7.9	9.5	12.7	609.6
44×36	1117.6	914.4	7.9	9.5	12.7	609.6
46×44	1168.4	1117.6	7.9	9.5	12.7	711.2
46×42	1168.4	1066.8	7.9	9.5	12.7	711.2
46×40	1168.4	1016.0	7.9	9.5	12.7	711.2
46×38	1168.4	965.2	7.9	9.5	12.7	711.2
48×46	1219.2	1168.4	7.9	9.5	12.7	711.2
48×44	1219.2	1117.6	7.9	9.5	12.7	711.2
48×42	1219.2	1066.8	7.9	9.5	12.7	711.2
48×40	1219.2	1016.0	7.9	9.5	12.7	711.2

- For Bevel Details See Page 119
- For Dimensional Tolerances See Page 117
- For Approx Weight See Page 125

Stainless Steel Butt - Weld Fittings

90° Elbows(Long, Short)
45° Elbows(Long, Short)

Sch 5S, 10S, 20S



KS B1541/3, JIS B2312/3

(in millimeters)

Nominal Pipe Size	Outside Diameter	Sch 5S		Sch 10S		Sch 20S		Long		Short	
		ID	T	ID	T	ID	T	A	B	A	B
1/2	21.7	18.4	1.65	17.5	2.1	16.7	2.5	38.1	15.8	—	—
5/8	27.2	23.9	1.65	23.0	2.1	22.2	2.5	38.1	15.8	—	—
1	34.0	30.7	1.65	28.4	2.8	28.0	3.0	38.1	15.8	25.4	—
1 1/4	42.7	39.4	1.65	37.1	2.8	36.7	3.0	47.6	19.7	31.8	13.2
1 1/2	48.6	45.3	1.65	43.0	2.8	42.6	3.0	57.2	23.7	38.1	15.8
2	60.5	57.2	1.65	54.9	2.8	53.5	3.5	76.2	31.6	50.8	21.0
2 1/2	76.3	72.1	2.10	70.3	3.0	69.3	3.5	95.3	39.5	63.5	26.3
3	89.1	84.9	2.10	83.1	3.0	81.1	4.0	114.3	47.3	76.2	31.6
3 1/2	101.6	97.4	2.10	95.6	3.0	93.6	4.0	133.4	55.3	88.9	36.8
4	114.3	110.1	2.10	108.3	3.0	106.3	4.0	152.4	63.1	101.6	42.1
5	139.8	134.2	2.80	133.0	3.4	129.8	5.0	190.5	78.9	127.0	52.6
6	165.2	159.6	2.80	158.4	3.4	155.2	5.0	228.6	94.7	152.4	63.1
8	216.3	210.7	2.80	208.3	4.0	203.3	6.5	304.8	126.2	203.2	84.2
10	267.4	260.6	3.40	259.4	4.0	254.4	6.5	381.0	157.8	254.0	105.2
12	318.5	310.5	4.00	309.5	4.5	305.5	6.5	457.2	189.4	304.8	126.2
14	355.6	347.6	4.00	346.0	4.8	339.8	7.9	533.4	220.9	355.6	147.3
16	406.4	398.0	4.20	396.8	4.8	390.6	7.9	609.6	252.5	406.4	168.3
18	457.2	448.8	4.20	447.6	4.8	441.4	7.9	685.8	284.1	457.2	189.4
20	508.0	498.4	4.80	497.0	5.5	492.2	7.9	762.0	315.6	508.0	210.4
22	558.8	549.2	4.80	547.8	5.5	—	—	838.2	347.2	558.8	231.5
24	609.6	598.6	5.50	596.8	6.4	—	—	914.4	378.7	609.6	252.5
30	762.0	749.2	6.40	746.2	7.9	—	—	1143.0	473.4	762.0	315.6

• For Bevel Details See Page 118

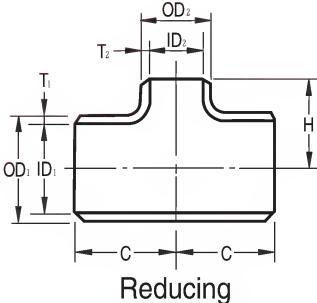
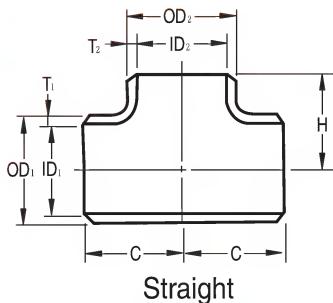
• For Dimensional Tolerances See Page 116

Stainless Steel Butt - Weld Fittings



Tees

Sch 5S, 10S, 20S



KS B1541/3, JIS B2312/3

(in millimeters)

Nominal Pipe Size	Outside Diameter		Wall Thickness T						C	M		
			5S		10S		20S					
	OD ₁	OD ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂				
1/2	21.7	21.7	1.65	1.65	2.1	2.1	2.5	2.5	25.4	25.4		
3/4	27.2	27.2	1.65	1.65	2.1	2.1	2.5	2.5	28.6	28.6		
1	34.0	34.0	1.65	1.65	2.8	2.8	3.0	3.0	38.1	38.1		
1 1/4	42.7	42.7	1.65	1.65	2.8	2.8	3.0	3.0	47.6	47.6		
1 1/4 x 1 1/4 x 1	42.7	34.0	1.65	1.65	2.8	2.8	3.0	3.0	47.6	47.6		
1 1/2	48.6	48.6	1.65	1.65	2.8	2.8	3.0	3.0	57.2	57.2		
1 1/2 x 1 1/2 x 1 1/2	48.6	42.7	1.65	1.65	2.8	2.8	3.0	3.0	57.2	57.2		
1 1/2 x 1 1/2	48.6	34.0	1.65	1.65	2.8	2.8	3.0	3.0	57.2	57.2		
2	60.5	60.5	1.65	1.65	2.8	2.8	3.5	3.5	63.5	63.5		
2 x 2 x 1 1/2	60.5	48.6	1.65	1.65	2.8	2.8	3.5	3.0	63.5	60.3		
2 x 2 x 1 1/4	60.5	42.7	1.65	1.65	2.8	2.8	3.5	3.0	63.5	57.2		
2 1/2	76.3	76.3	2.10	2.10	3.0	3.0	3.5	3.5	76.2	76.2		
2 1/2 x 2 1/2 x 2	76.3	60.5	2.10	1.65	3.0	2.8	3.5	3.5	76.2	69.9		
2 1/2 x 2 1/2 x 1 1/2	76.3	48.6	2.10	1.65	3.0	2.8	3.5	3.0	76.2	66.7		
3	89.1	89.1	2.10	2.10	3.0	3.0	4.0	4.0	85.7	85.7		
3 x 3 x 2 1/2	89.1	76.3	2.10	2.10	3.0	3.0	4.0	3.5	85.7	82.6		
3 x 3 x 2	89.1	60.5	2.10	1.65	3.0	2.8	4.0	3.5	85.7	76.2		
3 1/2	101.6	101.6	2.10	2.10	3.0	3.0	4.0	4.0	95.3	95.3		
3 1/2 x 3 1/2 x 3	101.6	89.1	2.10	2.10	3.0	3.0	4.0	4.0	95.3	92.1		
3 1/2 x 3 1/2 x 2 1/2	101.6	76.3	2.10	2.10	3.0	3.0	4.0	3.5	95.3	88.9		
4	114.3	114.3	2.10	2.10	3.0	3.0	4.0	4.0	104.8	104.8		
4 x 4 x 3 1/2	114.3	101.6	2.10	2.10	3.0	3.0	4.0	4.0	104.8	101.6		
4 x 4 x 3	114.3	89.1	2.10	2.10	3.0	3.0	4.0	4.0	104.8	98.4		
4 x 4 x 2 1/2	114.3	76.3	2.10	2.10	3.0	3.0	4.0	3.5	104.8	95.3		
5	139.8	139.8	2.80	2.80	3.4	3.4	5.0	5.0	123.8	123.8		
5 x 5 x 4	139.8	114.3	2.80	2.10	3.4	3.0	5.0	4.0	123.8	117.5		
5 x 5 x 3 1/2	139.8	101.6	2.80	2.10	3.4	3.0	5.0	4.0	123.8	114.3		
5 x 5 x 3	139.8	89.1	2.80	2.10	3.4	3.0	5.0	4.0	123.8	111.1		
6	165.2	165.2	2.80	2.80	3.4	3.4	5.0	5.0	142.9	142.9		
6 x 6 x 5	165.2	139.8	2.80	2.80	3.4	3.4	5.0	5.0	142.9	136.5		
6 x 6 x 4	165.2	114.3	2.80	2.10	3.4	3.0	5.0	4.0	142.9	130.2		
8	216.3	216.3	2.80	2.80	4.0	4.0	6.5	6.5	177.8	177.8		
8 x 8 x 6	216.3	165.2	2.80	2.80	4.0	3.4	6.5	5.0	177.8	168.3		
8 x 8 x 5	216.3	139.8	2.80	2.80	4.0	3.4	6.5	5.0	177.8	161.9		
10	267.4	267.4	3.40	3.40	4.0	4.0	6.5	6.5	215.9	215.9		
10 x 10 x 8	267.4	216.3	3.40	2.80	4.0	4.0	6.5	6.5	215.9	203.2		
10 x 10 x 6	267.4	165.2	3.40	2.80	4.0	3.4	6.5	5.0	215.9	193.7		
12	318.5	318.5	4.00	4.00	4.5	4.5	6.5	6.5	254.0	254.0		
12 x 12 x 10	318.5	267.4	4.00	3.40	4.5	4.0	6.5	6.5	254.0	241.3		
12 x 12 x 8	318.5	216.3	4.00	2.80	4.5	4.0	6.5	6.5	254.0	228.6		

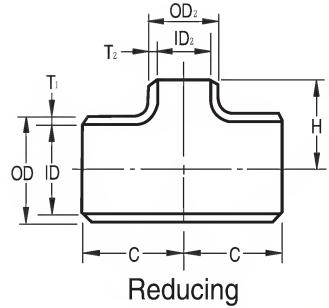
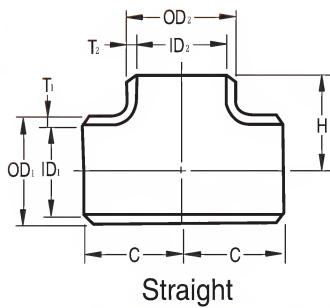
• For Bevel Details See Page 118

• For Dimensional Tolerances See Page 116

Stainless Steel Butt - Weld Fittings

Tees

Sch 5S, 10S, 20S



KS B1541/3, JIS B2312/3

(in millimeters)

Nominal Pipe Size	Outside Diameter		Wall Thickness T								C	M		
	5S		10S		20S		T ₁		T ₂					
	OD ₁	OD ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂				
14	355.6	355.6	4.0	4.0	4.8	4.8	7.9	7.9	279.4	279.4				
14×14×12	355.6	318.5	4.0	4.0	4.8	4.5	7.9	6.5	279.4	269.9				
14×14×10	355.6	267.4	4.0	3.4	4.8	4.0	7.9	6.5	279.4	257.2				
14×14×8	355.6	216.3	4.0	2.8	4.8	4.0	7.9	6.5	279.4	247.7				
16	406.4	406.4	4.2	4.2	4.8	4.8	7.9	7.9	304.8	304.8				
16×16×14	406.4	355.6	4.2	4.0	4.8	4.8	7.9	7.9	304.8	304.8				
16×16×12	406.4	318.5	4.2	4.0	4.8	4.5	7.9	6.5	304.8	295.3				
16×16×10	406.4	267.4	4.2	3.4	4.8	4.0	7.9	6.5	304.8	282.6				
18	457.2	457.2	4.2	4.2	4.8	4.8	7.9	7.9	342.9	342.9				
18×18×16	457.2	406.4	4.2	4.2	4.8	4.8	7.9	7.9	342.9	330.2				
18×18×14	457.2	355.6	4.2	4.0	4.8	4.8	7.9	7.9	342.9	330.2				
18×18×12	457.2	318.5	4.2	4.0	4.8	4.5	7.9	6.5	342.9	320.7				
20	508.0	508.0	4.8	4.8	5.5	5.5	7.9	7.9	381.0	381.0				
20×20×18	508.0	457.2	4.8	4.2	5.5	4.8	7.9	7.9	381.0	368.3				
20×20×16	508.0	406.4	4.8	4.2	5.5	4.8	7.9	7.9	381.0	355.6				
20×20×14	508.0	355.6	4.8	4.0	5.5	4.8	7.9	7.9	381.0	355.6				
22	558.8	558.8	4.8	4.8	5.5	5.5	—	—	419.1	419.1				
22×22×20	558.8	508.0	4.8	4.8	5.5	5.5	—	—	419.1	406.4				
22×22×18	558.8	457.2	4.8	4.2	5.5	4.8	—	—	419.1	393.7				
22×22×16	558.8	406.4	4.8	4.2	5.5	4.8	—	—	419.1	381				
24	609.6	609.6	5.5	5.5	6.4	6.4	—	—	431.8	431.8				
24×24×22	609.6	558.8	5.5	4.8	6.4	5.5	—	—	431.8	431.8				
24×24×20	609.6	508.0	5.5	4.8	6.4	5.5	—	—	431.8	431.8				
24×24×18	609.6	457.2	5.5	4.2	6.4	4.8	—	—	431.8	419.1				
30	762.0	762.0	6.4	6.4	7.9	7.9	—	—	558.8	558.8				
30×30×24	762.0	609.6	6.4	5.5	7.9	6.4	—	—	558.8	533.4				

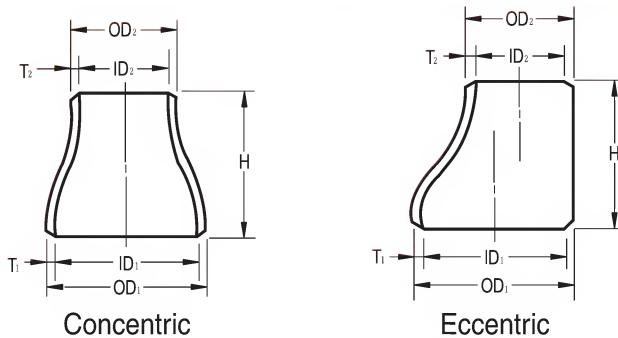
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116

Stainless Steel Butt - Weld Fittings



Reducers

Sch 5S, 10S, 20S



KS B1541/3, JIS B2312/3

(in millimeters)

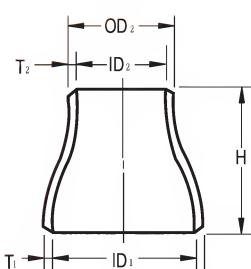
Nominal Pipe Size	Outside Diameter		Wall Thickness T								H
			5S		10S		20S		T ₁		
	OD ₁	OD ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
1 × 3/4	34.0	27.2	1.65	1.65	2.8	2.1	3.0	2.5	50.8	50.8	
1 × 1/2	34.0	21.7	1.65	1.65	2.8	2.1	3.0	2.5	50.8	50.8	
1 1/4 × 1	42.7	34.0	1.65	1.65	2.8	2.8	3.0	3.0	50.8	50.8	
1 1/4 × 3/4	42.7	27.2	1.65	1.65	2.8	2.1	3.0	2.5	50.8	50.8	
1 1/2 × 1 1/4	48.6	42.7	1.65	1.65	2.8	2.8	3.0	3.0	63.5	63.5	
1 1/2 × 1	48.6	34.0	1.65	1.65	2.8	2.8	3.0	3.0	63.5	63.5	
1 1/2 × 3/4	48.6	27.0	1.65	1.65	2.8	2.1	3.0	2.5	63.5	63.5	
2 × 1 1/2	60.5	48.6	1.65	1.65	2.8	2.8	3.5	3.0	76.2	76.2	
2 × 1 1/4	60.5	42.7	1.65	1.65	2.8	2.8	3.5	3.0	76.2	76.2	
2 × 1	60.5	34.0	1.65	1.65	2.8	2.8	3.5	3.0	76.2	76.2	
2 1/2 × 2	76.3	60.5	2.10	1.65	3.0	2.8	3.5	3.5	88.9	88.9	
2 1/2 × 1 1/2	76.3	48.6	2.10	1.65	3.0	2.8	3.5	3.0	88.9	88.9	
2 1/2 × 1 1/4	76.3	42.7	2.10	1.65	3.0	2.8	3.5	3.0	88.9	88.9	
3 × 2 1/2	89.1	76.3	2.10	2.10	3.0	3.0	4.0	3.5	88.9	88.9	
3 × 2	89.1	60.5	2.10	1.65	3.0	2.8	4.0	3.5	88.9	88.9	
3 × 1 1/2	89.1	48.6	2.10	1.65	3.0	2.8	4.0	3.0	88.9	88.9	
3 1/2 × 3	101.6	89.1	2.10	2.10	3.0	3.0	4.0	4.0	101.6	101.6	
3 1/2 × 2 1/2	101.6	76.3	2.10	2.10	3.0	3.0	4.0	3.5	101.6	101.6	
3 1/2 × 2	101.6	60.5	2.10	1.65	3.0	2.8	4.0	3.5	101.6	101.6	
4 × 3 1/2	114.3	101.6	2.10	2.10	3.0	3.0	4.0	4.0	101.6	101.6	
4 × 3	114.3	89.1	2.10	2.10	3.0	3.0	4.0	4.0	101.6	101.6	
4 × 2 1/2	114.3	76.3	2.10	2.10	3.0	3.0	4.0	3.5	101.6	101.6	
4 × 2	114.3	60.5	2.10	1.65	3.0	2.8	4.0	3.5	101.6	101.6	
5 × 4	139.8	114.3	2.80	2.10	3.4	3.0	5.0	4.0	127.0	127.0	
5 × 3 1/2	139.8	101.6	2.80	2.10	3.4	3.0	5.0	4.0	127.0	127.0	
5 × 3	139.8	89.1	2.80	2.10	3.4	3.0	5.0	4.0	127.0	127.0	
5 × 2 1/2	139.8	76.3	2.80	2.10	3.4	3.0	5.0	3.5	127.0	127.0	
6 × 5	165.2	139.8	2.80	2.80	3.4	3.4	5.0	5.0	139.7	139.7	
6 × 4	165.2	114.3	2.80	2.10	3.4	3.0	5.0	4.0	139.7	139.7	
6 × 5 1/2	165.2	101.6	2.80	2.10	3.4	3.0	5.0	4.0	139.7	139.7	
6 × 3	165.2	89.1	2.80	2.10	3.4	3.0	5.0	4.0	139.7	139.7	
8 × 6	216.3	165.2	2.80	2.80	4.0	3.4	6.5	5.0	152.4	152.4	
8 × 5	216.3	139.8	2.80	2.80	4.0	3.4	6.5	5.0	152.4	152.4	
8 × 4	216.3	114.3	2.80	2.10	4.0	3.0	6.5	4.0	152.4	152.4	

- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116

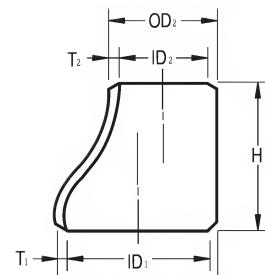
Stainless Steel Butt - Weld Fittings

Reducers

Sch 5S, 10S, 20S



Concentric



Eccentric

KS B1541/3, JIS B2312/3

(in millimeters)

Nominal Pipe Size	Outside Diameter		Wall Thickness T						H
			5S		10S		20S		
	OD ₁	OD ₂	T ₁	T ₂	T ₁	T ₂	T ₁	T ₂	
10×8	267.4	216.3	3.4	2.8	4.0	4.0	6.5	6.5	177.8
10×6	267.4	165.2	3.4	2.8	4.0	3.4	6.5	5.0	177.8
12×10	318.5	267.4	4.0	3.4	4.5	4.0	6.5	6.5	203.2
12×8	318.5	216.3	4.0	2.8	4.5	4.0	6.5	6.5	203.2
12×6	318.5	165.2	4.0	2.8	4.5	3.4	6.5	5.0	203.2
14×12	355.6	318.5	4.0	4.0	4.8	4.5	7.9	6.5	330.2
14×10	355.6	267.4	4.0	3.4	4.8	4.0	7.9	6.5	330.2
14×8	355.6	216.3	4.0	2.8	4.8	4.0	7.9	6.5	330.2
16×14	406.4	355.6	4.2	4.0	4.8	4.8	7.9	7.9	355.6
16×12	406.4	318.5	4.2	4.0	4.8	4.5	7.9	6.5	355.6
16×10	406.4	267.4	4.2	3.4	4.8	4.0	7.9	6.5	355.6
18×16	457.2	406.4	4.2	4.2	4.8	4.8	7.9	7.9	381.0
18×14	457.2	355.6	4.2	4.0	4.8	4.8	7.9	7.9	381.0
18×12	457.2	318.5	4.2	4.0	4.8	4.5	7.9	6.5	381.0
20×18	508.0	457.2	4.8	4.2	5.5	4.8	7.9	7.9	508.0
20×16	508.0	406.4	4.8	4.2	5.5	4.8	7.9	7.9	508.0
20×14	508.0	355.6	4.8	4.0	5.5	4.8	7.9	7.9	508.0
22×20	558.8	508.0	4.8	4.8	5.5	5.5	—	—	508.0
22×18	558.8	457.2	4.8	4.2	5.5	4.8	—	—	508.0
22×16	558.8	406.4	4.8	4.2	5.5	4.8	—	—	508.0
24×22	609.6	558.8	5.5	4.8	6.4	5.5	—	—	508.0
24×20	609.6	508.0	5.5	4.8	6.4	5.5	—	—	508.0
24×18	609.6	457.2	5.5	4.2	6.4	4.8	—	—	508.0
30×24	762.0	609.0	6.4	5.5	7.9	6.4	—	—	609.0

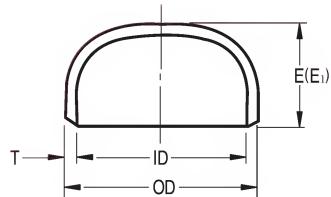
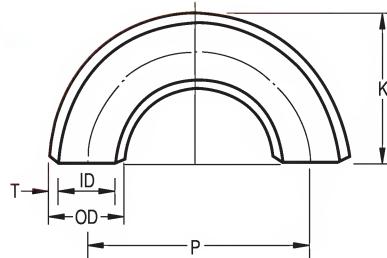
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116

Stainless Steel Butt - Weld Fittings



180° Elbows(Long, Short) Caps

Sch 5S, 10S, 20S



KS B1541, JIS B2312

(in millimeters)

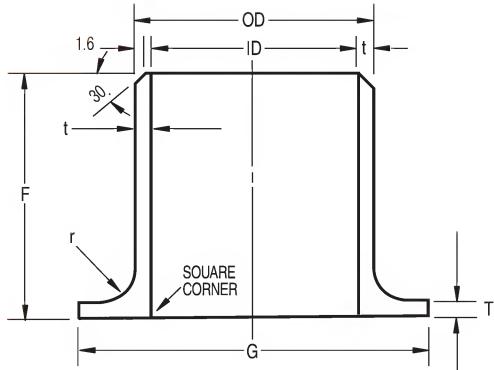
Nominal Pipe Size	Outside Diameter OD	Wall Thickness T			E	E ₁	Limited Wall thickness	Long		Short	
		5S	10S	20S				P	K	P	K
1/2	21.7	1.65	2.1	2.5	25.4	—	—	76.2	49.0	—	—
5/8	27.2	1.65	2.1	2.5	25.4	—	—	76.2	51.7	—	—
1	34.0	1.65	2.8	3.0	38.1	—	—	76.2	55.1	50.8	42.4
1 1/4	42.7	1.65	2.8	3.0	38.1	—	—	95.2	69.0	63.6	53.2
1 1/2	48.6	1.65	2.8	3.0	38.1	38.1	5.1	114.4	81.5	76.2	62.4
2	60.5	1.65	2.8	3.5	38.1	44.5	5.5	152.4	106.5	101.6	81.1
2 1/2	76.3	2.10	3.0	3.5	38.1	50.8	7.0	190.6	133.5	127.0	101.7
3	89.1	2.10	3.0	4.0	50.8	63.5	7.6	228.6	158.9	152.4	120.8
3 1/2	101.6	2.10	3.0	4.0	63.5	76.2	8.1	266.8	184.2	177.8	139.7
4	114.3	2.10	3.0	4.0	63.5	76.2	8.6	304.8	209.6	203.2	158.8
5	139.8	2.80	3.4	5.0	76.2	88.9	9.5	381.0	260.4	254.0	196.9
6	165.2	2.80	3.4	5.0	88.9	101.6	11.0	457.2	311.2	304.8	235.0
8	216.3	2.80	4.0	6.5	101.6	127.0	12.7	609.6	413.0	406.4	311.4
10	267.4	3.40	4.0	6.5	127.0	152.4	12.7	762.0	514.7	508.0	387.7
12	318.5	4.00	4.5	6.5	152.4	177.8	12.7	914.4	616.5	609.6	464.1
14	355.6	4.00	4.8	7.9	165.1	190.5	12.7	1066.8	711.2	711.2	533.4
16	406.4	4.20	4.8	7.9	177.8	203.2	12.7	1219.2	812.8	812.8	609.6
18	457.2	4.20	4.8	7.9	203.2	228.6	12.7	1371.6	914.4	914.4	685.8
20	508.0	4.80	5.5	7.9	228.6	254.0	12.7	1524.0	1016.0	1016.0	762.0

- The Back-To-Face Dimension of Cap Shall Be E, If The Basic Wall Thickness is Not More Than The "Limited Wall Thickness" And E₁ If It Exceeds The "Limited Wall Thickness"
- For Bevel Details See Page 118
- For Dimensional Tolerances See Page 116

Stainless Steel Butt - Weld Fittings

Lap Joint(Stub Ends)

Sch 5S, 10S, 20S



JPI - 7S - I5 - 84

(in millimeters)

Nominal Pipe Size	Outside Diameter OD	Sch 5s		Sch 10s		Sch 20s		Sch 40s		F	G	r ₂
		ID	t	ID	t	ID	t	ID	t			
1/2	21.7	18.4	1.65	17.5	2.1	16.7	2.5	16.1	2.8	50	35	3.2
3/4	27.2	23.9	1.65	23.0	2.1	22.2	2.5	21.4	2.9	50	43	3.2
1	34.0	30.7	1.65	28.4	2.8	28.0	3.0	27.2	3.4	50	51	3.2
1 1/4	42.7	39.4	1.65	37.1	2.8	36.7	3.0	35.5	3.6	50	64	4.8
1 1/2	48.6	45.3	1.65	43.0	2.8	42.6	3.0	41.2	3.7	50	73	6.4
2	60.5	57.2	1.65	54.9	2.8	53.5	3.5	52.7	3.9	65	92	7.9
2 1/2	76.3	72.1	2.10	70.3	3.0	69.3	3.5	65.9	5.2	65	105	7.9
3	89.1	84.9	2.10	83.1	3.0	81.1	4.0	78.1	5.5	65	127	9.5
3 1/2	101.6	97.4	2.10	95.6	3.0	93.6	4.0	90.2	5.7	75	140	9.5
4	114.3	110.1	2.10	108.3	3.0	106.3	4.0	102.3	6.0	75	157	11.1
5	139.8	134.2	2.80	133.0	3.4	129.8	5.0	126.6	6.6	75	186	11.1
6	165.2	159.6	2.80	158.4	3.4	155.2	5.0	151.0	7.1	90	216	12.7
8	216.3	210.7	2.80	208.3	3.8	203.3	6.4	199.9	8.2	100	270	12.7
10	267.4	260.6	3.40	259.4	4.2	254.4	6.4	248.8	9.3	125	324	12.7
12	318.5	310.5	4.00	309.5	4.6	305.5	6.4	297.9	9.5	150	381	12.7

- Minimum Lap Thickness "T" Shall not be less than Wall Thickness "t"

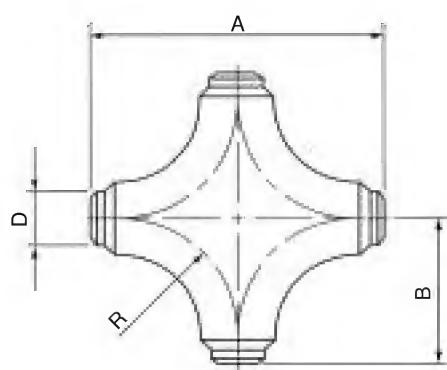
Nominal Pipe Size	O.D	Sch 10s		Sch 20s		Sch 40s		F	G	Approx Weight		
		ID	t	ID	t	ID	t			10s	20s	40s
1/2	21.7	17.5	2.1	16.7	2.5	16.1	2.8	30	51	0.059	0.070	0.078
3/4	27.2	23.0	2.1	22.2	2.5	21.4	2.9	30	56	0.073	0.086	0.099
1	34.0	28.4	2.8	28.0	3.0	27.2	3.4	50	67	0.172	0.184	0.207
1 1/4	42.7	37.1	2.8	36.7	3.0	35.5	3.6	50	76	0.217	0.231	0.275
1 1/2	48.6	43.0	2.8	42.6	3.0	41.2	3.7	50	81	0.242	0.258	0.316
2	60.5	54.9	2.8	53.5	3.5	52.7	3.9	50	96	0.308	0.383	0.424
2 1/2	76.3	70.3	3.0	69.3	3.5	65.9	5.2	50	116	0.430	0.499	0.731
3	89.1	83.1	3.0	81.1	4.0	78.1	5.5	50	126	0.484	0.640	0.870
3 1/2	101.6	95.6	3.0	93.6	4.0	90.2	5.7	50	136	0.536	0.710	1.00
4	114.3	108.3	3.0	106.3	4.0	102.3	6.0	50	151	0.614	0.814	1.21
5	139.8	133.0	3.4	129.8	5.0	126.6	6.6	50	182	0.879	1.28	1.68
6	165.2	158.4	3.4	155.2	5.0	151.0	7.1	50	212	1.07	1.57	2.21
8	216.3	208.3	4.0	203.3	6.5	199.9	8.2	65	262	1.94	3.12	3.92
10	267.4	259.4	4.0	254.4	6.5	248.8	9.3	65	324	2.53	4.08	5.80
12	318.5	309.5	4.5	305.5	6.5	297.9	10.3	65	368	3.25	4.67	7.34

- Dimensions Conform to TK Standards.
- This specification used for JIS 10K Flanges.

High Pressure Fittings

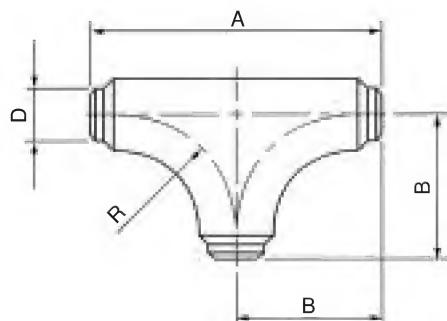
- High Pressure Maniford Fittings __ P86~P89
- Api Flange Studded Crosses & Tees __ P90
- Api Flange __ P91~P94

High Pressure Manifold Fittings



FULL FLOW CROSS

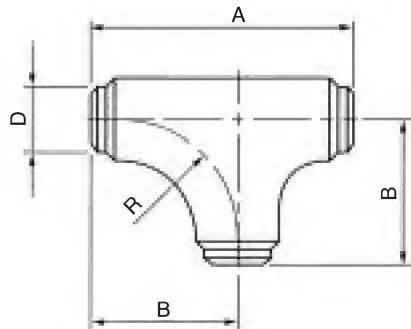
Size	ALL DIMENSIONS IN mm			
	D	A	B	R
2"	60.3	406	203	150
3"	88.9	406	203	150
4"	114.3	560	280	210
5"	141.3	610	305	240
6"	168.3	762	381	305



FULL FLOW TEE

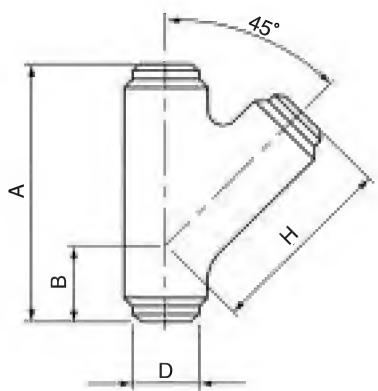
Size	ALL DIMENSIONS IN mm			
	D	A	B	R
2"	60.3	406	203	150
3"	88.9	406	203	150
4"	114.3	560	280	210
5"	141.3	610	305	240
6"	168.3	762	381	305

High Pressure Manifold Fittings



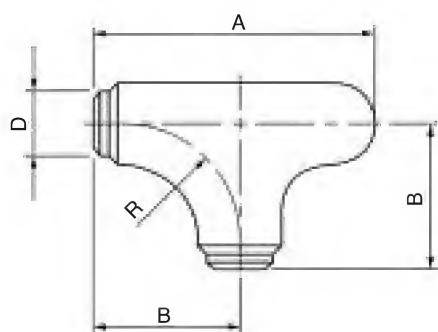
LONG SWEEP TEE

Size	ALL DIMENSIONS IN mm			
	D	A	B	R
2 "	60.3	330	203	150
3 "	88.9	330	203	150
4 "	114.3	406	280	210
5 "	141.3	483	305	240
6 "	168.3	686	381	305



45° LATERAL TEE

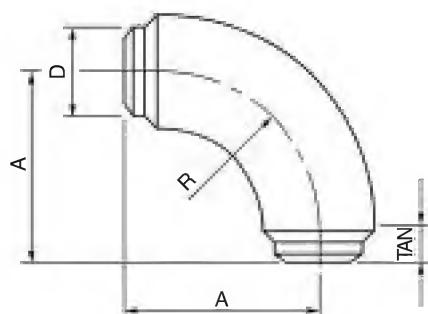
Size	ALL DIMENSIONS IN mm			
	D	A	B	H
2 "	60.3	365	115	265
3 "	88.9	365	115	265
4 "	114.3	510	155	365
5 "	141.3	550	165	405
6 "	168.3	670	195	505



LONG SWEEP TEE WITH INTEGRAL BULL PLUG

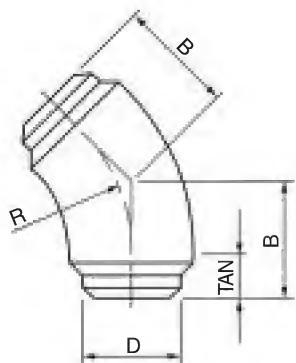
Size	ALL DIMENSIONS IN mm				
	D	T	A	B	R
2 "	60.3	11.1	385	203	150
3 "	88.9	15.2	385	203	150
4 "	114.3	17.1	496	280	210
5 "	141.3	19.0	582	305	240
6 "	168.3	21.9	805	381	304

High Pressure Manifold Fittings



90° LONG SWEEP ELBOW

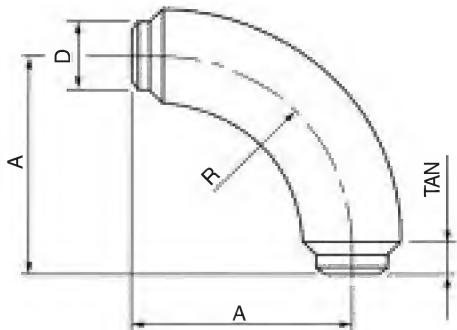
Size	ALL DIMENSIONS IN mm			
	D	A	R	TAN
2"	60.3	203	150	53
3"	88.9	203	150	53
4"	114.3	280	210	70
5"	141.3	305	240	65
6"	168.3	381	305	76



45° LONG SWEEP ELBOW

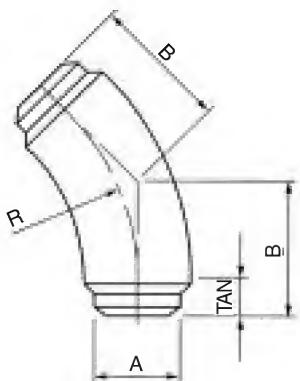
Size	ALL DIMENSIONS IN mm			
	D	B	R	TAN
2"	60.3	119	150	56
3"	88.9	119	150	56
4"	114.3	162	210	75
5"	141.3	172	240	72
6"	168.3	203	305	76

High Pressure Manifold Fittings



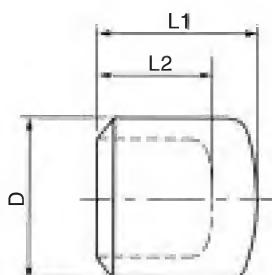
90° 3D DOUBLE BACKED BEND

Size	ALL DIMENSIONS IN mm			
	D	A	R	TAN
2"	60.3	178	152	26
3"	88.9	305	229	76
4"	114.3	356	305	51
5"	141.3	432	381	51
6"	168.3	533	457	76



45° 3D DOUBLE BACKED BEND

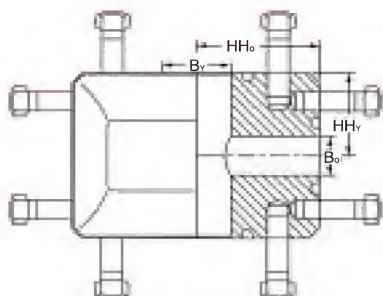
Size	ALL DIMENSIONS IN mm			
	D	B	R	TAN
2"	60.3	121	152	58
3"	88.9	171	229	76
4"	114.3	178	305	51
5"	141.3	209	381	51
6"	168.3	266	457	76



BULL PLUG

Size	ALL DIMENSIONS IN mm		
	D	L1	L2
2"	60.3	70	48
3"	88.9	90	60
4"	114.3	115	81
5"	141.3	140	102
6"	168.3	170	126

Api Flange Studded Croasses & Tees



API Flange studded Cross & Tee



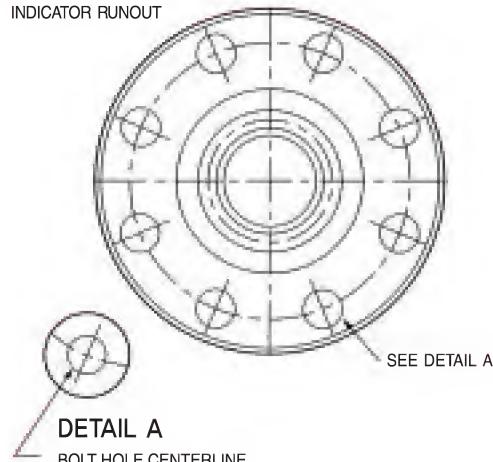
Rated Working Pressure (psi)	Vertical Bv +1,-0mm	Outlet Bo +1,-0mm	Center to Face Vertical Run, HHv ±0.8mm	Center to Face Horizontal Run, HHo ±0.8mm
2000	52	52	89.0	89.0
2000	65	52	89.0	101.5
2000	65	65	114.5	114.5
2000	78	52	114.5	114.5
2000	78	65	114.5	114.5
2000	78	78	114.5	114.5
2000	103	52	114.5	139.5
2000	103	65	114.5	139.5
2000	103	78	114.5	139.5
2000	103	103	139.5	139.5
3000	78	52	114.5	127.0
3000	78	65	127.0	127.0
3000	78	78	127.0	127.0
3000	103	52	114.5	156.0
3000	103	65	127.0	156.0
3000	103	78	127.0	156.0
3000	103	103	156.0	156.0
5000	52	52	114.5	114.5
5000	65	52	114.5	127.0
5000	65	65	127.0	127.0
5000	78	52	114.5	139.5
5000	78	65	139.5	139.5
5000	78	78	139.5	139.5
5000	103	52	114.5	165.0
5000	103	65	127.0	165.0
5000	103	78	139.5	165.0
5000	103	103	165.0	165.0
10000	46	46	111.0	111.0
10000	52	46	111.0	111.0
10000	52	52	111.0	111.0
10000	65	46	114.5	130.0
10000	65	52	114.5	130.0
10000	65	65	130.0	130.0
10000	78	46	114.5	149.0
10000	78	52	114.5	149.0

Rated Working Pressure (psi)	Vertical Bv +1,-0mm	Outlet Bo +1,-0mm	Center to Face Vertical Run, HHv ±0.8mm	Center to Face Horizontal Run, HHo ±0.8mm
10000	78	65	130.0	149.0
10000	78	78	149.0	149.0
10000	103	46	114.5	174.5
10000	103	52	114.5	174.5
10000	103	65	130.0	174.5
10000	103	78	149.0	174.5
10000	103	103	174.5	174.5
15000	46	46	127.0	127.0
15000	52	46	127.0	127.0
15000	52	52	127.0	127.0
15000	65	46	139.5	139.5
15000	65	52	139.5	139.5
15000	65	65	139.5	139.5
15000	78	46	160.5	160.5
15000	78	52	160.5	160.5
15000	78	65	160.5	160.5
15000	78	78	160.5	160.5
15000	78	103	194.0	194.0
15000	103	52	194.0	194.0
15000	103	65	194.0	194.0
15000	103	78	194.0	194.0
15000	103	103	194.0	194.0
20000	46	46	164.5	164.5
20000	52	46	164.5	164.5
20000	52	52	164.5	164.5
20000	65	46	185.0	185.0
20000	65	52	185.0	185.0
20000	65	65	185.0	185.0
20000	65	78	185.0	185.0
20000	65	103	251.5	251.5
20000	78	46	202.5	202.5
20000	78	52	202.5	202.5
20000	78	65	202.5	202.5
20000	78	78	202.5	202.5
20000	78	103	251.5	251.5
20000	103	52	251.5	251.5
20000	103	65	251.5	251.5
20000	103	78	251.5	251.5
20000	103	103	251.5	251.5

Api Flange - Type 6bx Integral Flanges

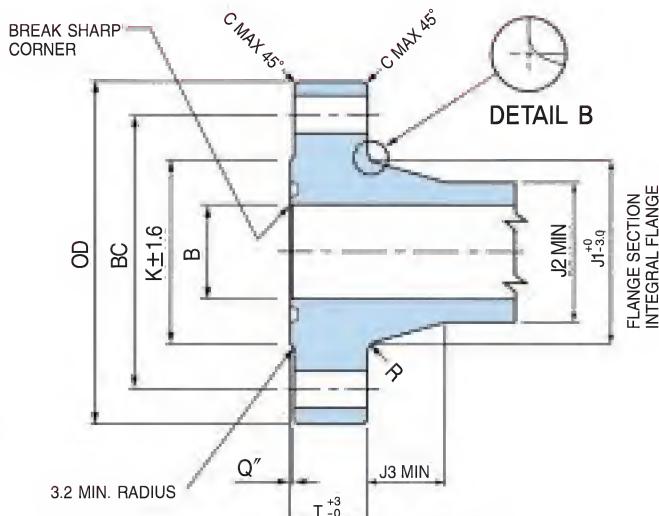


B TO RING GROOVE
MUST BE CONCENTRIC
WITHIN 0.25 TOTAL
INDICATOR RUNOUT



DETAIL A

BOLT HOLE CENTERLINE
LOCATED WITHIN 0.8
OF THEORETICAL B.C.
AND EQUAL SPACING

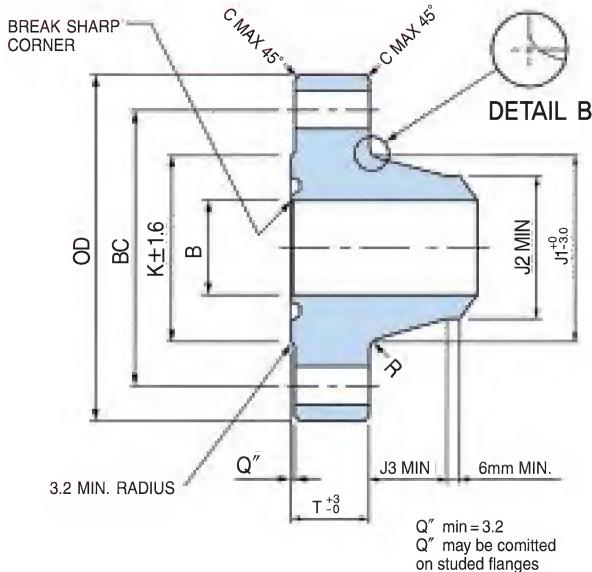
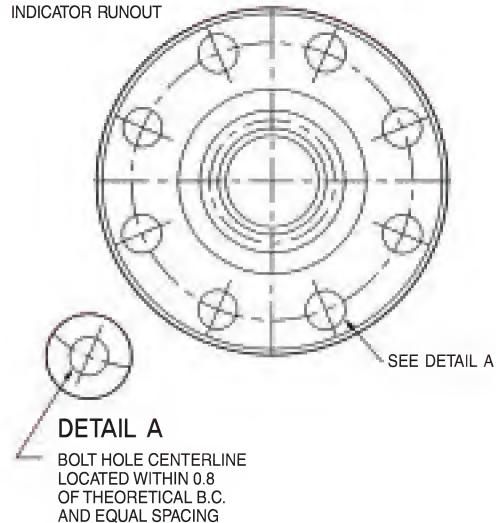


$Q'' \text{ min} = 3.2$
 Q'' may be omitted
on studed flanges

Basic Flange Dimensions													Boltin g Dimensions						
Nominal Size of Flange	in.	mm	Maximum Bore	Outside Diameter of Flange	Tolerance	Maximum Chamfer	Diameter of Raised Face	Total Thickness of Flange	Large Diameter of Hub	Small Diameter of Hub	Length of Hub	Radius of Hub	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Diameter of Bolt Holes	Bolt Hole Tolerance	Minimum Length of Stud Bolts	Ring Number
			B	OD	OD	C	K	T	J1	J2	J3	R	BC		in.	mm	Lss b	BX	
10000 psi																			
1- $\frac{13}{16}$	46	46.8	190	2	3	105	42.1	88.9	65.1	48.4	10	146.0	8	$\frac{3}{4}$	23	+2/-0.5	130	151	
2- $\frac{1}{16}$	52	53.2	200	2	3	111	44.1	100.0	74.6	51.6	10	158.8	8	$\frac{3}{4}$	23	+2/-0.5	130	152	
2- $\frac{9}{16}$	65	65.9	230	2	3	132	51.2	120.7	92.1	57.2	10	184.2	8	$\frac{7}{8}$	25	+2/-0.5	150	153	
3- $\frac{1}{16}$	78	78.6	270	2	3	152	58.4	142.1	110.4	63.5	10	215.9	8	1	29	+2/-0.5	170	154	
4- $\frac{1}{16}$	103	104.0	315	2	3	185	70.3	182.6	146.1	73.1	10	258.8	8	$1\frac{1}{8}$	32	+2/-0.5	200	155	
5- $\frac{1}{8}$	130	131.0	360	2	3	221	79.4	223.8	182.6	81.0	10	300.0	12	$1\frac{1}{8}$	32	+2/-0.5	220	169	
7- $\frac{1}{16}$	179	180.2	479	3	6	302	103.2	301.6	254.0	95.3	16	403.2	12	$1\frac{1}{2}$	42	+2/-0.5	285	156	
9	228	229.4	555	3	6	359	123.8	374.7	327.1	93.7	16	476.2	16	$1\frac{1}{2}$	42	+2/-0.5	330	157	
11	279	280.2	655	3	6	429	141.3	450.9	400.1	103.2	16	565.2	16	$1\frac{3}{4}$	48	+3/-0.5	380	158	
13- $\frac{5}{8}$	346	346.9	770	3	6	518	168.3	552.5	495.3	114.3	16	673.1	20	$1\frac{7}{8}$	51	+3/-0.5	440	159	
16- $\frac{3}{4}$	425	426.2	870	3	6	576	168.3	655.6	601.7	76.2	19	776.3	24	$1\frac{7}{8}$	51	+3/-0.5	440	162	
15000 psi																			
1- $\frac{13}{16}$	46	46.8	210	2	3	106	45.2	97.6	71.4	47.6	10	160.3	8	$\frac{7}{8}$	26	+2/-0.5	140	151	
2- $\frac{1}{16}$	52	53.2	220	2	3	114	50.8	111.1	82.6	54.0	10	174.6	8	$\frac{7}{8}$	26	+2/-0.5	150	152	
2- $\frac{9}{16}$	65	65.9	250	2	3	133	57.1	128.6	100.0	57.1	10	200.0	8	1	30	+2/-0.5	170	153	
3- $\frac{1}{16}$	78	78.6	290	2	3	154	64.3	154.0	122.2	63.5	10	230.2	8	$1\frac{1}{8}$	32	+2/-0.5	190	154	
4- $\frac{1}{16}$	103	104.0	360	2	3	194	78.6	195.3	158.8	73.0	10	290.5	8	$1\frac{3}{8}$	40	+2/-0.5	235	155	
7- $\frac{1}{16}$	179	180.2	505	3	6	305	119.1	325.4	276.2	66.7	16	428.6	16	$1\frac{1}{2}$	42	+2/-0.5	325	156	
20000 psi																			
1- $\frac{13}{16}$	46	46.8	255	2	3	117	63.5	133.3	109.5	49.2	10	203.2	8	1	30	+2/-0.5	190	151	
2- $\frac{1}{16}$	52	53.2	285	2	3	132	71.5	154.0	127.0	52.4	10	230.2	8	$1\frac{1}{8}$	32	+2/-0.5	210	152	
2- $\frac{9}{16}$	65	65.9	325	2	3	151	79.4	173.0	144.4	58.7	10	261.9	8	$1\frac{1}{4}$	36	+2/-0.5	235	153	
3- $\frac{1}{16}$	78	78.6	355	2	3	171	85.7	192.1	160.3	63.5	10	287.3	8	$1\frac{3}{8}$	40	+2/-0.5	255	154	
4- $\frac{1}{16}$	103	104.0	445	2	3	219	106.4	242.9	206.4	73.0	10	357.2	8	$1\frac{3}{4}$	48	+3/-0.5	310	155	
7- $\frac{1}{16}$	179	180.2	655	3	6	352	165.1	385.7	338.1	96.8	16	554.0	16	2	54	+3/-0.5	445	156	

Api Flange - Type 6bx Weld Neck Flanges

B TO RING GROOVE
MUST BE CONCENTRIC
WITHIN 0.25 TOTAL
INDICATOR RUNOUT

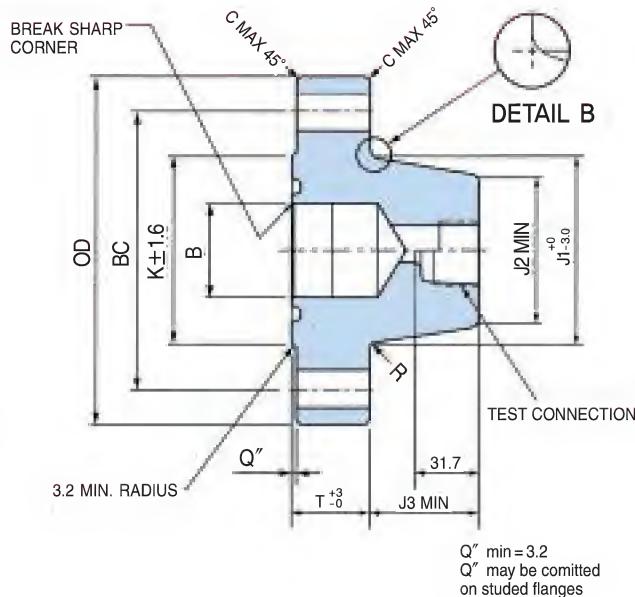
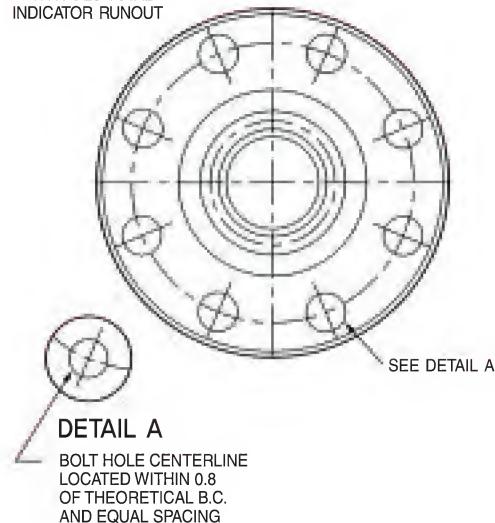


Basic Flange Dimensions														Bolting Dimensions					
Nominal Size of Flange	in.	mm	Maximum Bore	Outside Diameter of Flange	Tolerance	Maximum Chamfer	Diameter of Raised Face	Total Thickness of Flange	Large Diameter of Hub	Small Diameter of Hub	Length of Hub	Radius of Hub	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Diameter of Bolt Holes	Bolt Hole Tolerance	Minimum Length of Stud Bolts	Ring Number
														in.	mm	Lssb	BX		
10000 psi																			
1 $^{-13}_{-16}$	46	46.8	190	2	3	105	42.1	88.9	65.1	48.4	10	146.0	8	$^{3/4}_{-1/4}$	23	$^{+2/-0.5}_{-0.5}$	130	151	
2 $^{-1}_{-16}$	52	53.2	200	2	3	111	44.1	100.0	74.6	51.6	10	158.8	8	$^{3/4}_{-1/4}$	23	$^{+2/-0.5}_{-0.5}$	130	152	
2 $^{-9}_{-16}$	65	65.9	230	2	3	132	51.2	120.7	92.1	57.2	10	184.2	8	$^{7/8}_{-1/2}$	25	$^{+2/-0.5}_{-0.5}$	150	153	
3 $^{-1}_{-16}$	78	78.6	270	2	3	152	58.4	142.1	110.4	63.5	10	215.9	8	1	29	$^{+2/-0.5}_{-0.5}$	170	154	
4 $^{-1}_{-16}$	103	104.0	315	2	3	185	70.3	182.6	146.1	73.1	10	258.8	8	$^{1-1/8}_{-1/8}$	32	$^{+2/-0.5}_{-0.5}$	200	155	
5 $^{-1}_{-8}$	130	131.0	360	2	3	221	79.4	223.8	182.6	81.0	10	300.0	12	$^{1-1/8}_{-1/8}$	32	$^{+2/-0.5}_{-0.5}$	220	169	
7 $^{-1}_{-16}$	179	180.2	479	3	6	302	103.2	301.6	254.0	95.3	16	403.2	12	$^{1-1/2}_{-1/2}$	42	$^{+2/-0.5}_{-0.5}$	285	156	
9	228	229.4	555	3	6	359	123.8	374.7	327.1	93.7	16	476.2	16	$^{1-1/2}_{-1/2}$	42	$^{+2/-0.5}_{-0.5}$	330	157	
11	279	280.2	655	3	6	429	141.3	450.9	400.1	103.2	16	565.2	16	$^{1-3/4}_{-3/4}$	48	$^{+3/-0.5}_{-0.5}$	380	158	
13 $^{-5}_{-8}$	346	346.9	770	3	6	518	168.3	552.5	495.3	114.3	16	673.1	20	$^{1-7/8}_{-7/8}$	51	$^{+3/-0.5}_{-0.5}$	440	159	
16 $^{-3}_{-4}$	425	426.2	870	3	6	576	168.3	655.6	601.7	76.2	19	776.3	24	$^{1-7/8}_{-7/8}$	51	$^{+3/-0.5}_{-0.5}$	440	162	
15000 psi																			
1 $^{-13}_{-16}$	46	46.8	210	2	3	106	45.2	97.6	71.4	47.6	10	160.3	8	$^{7/8}_{-1/2}$	26	$^{+2/-0.5}_{-0.5}$	140	151	
2 $^{-1}_{-16}$	52	53.2	220	2	3	114	50.8	111.1	82.6	54.0	10	174.6	8	$^{7/8}_{-1/2}$	26	$^{+2/-0.5}_{-0.5}$	150	152	
2 $^{-9}_{-16}$	65	65.9	250	2	3	133	57.1	128.6	100.0	57.1	10	200.0	8	1	30	$^{+2/-0.5}_{-0.5}$	170	153	
3 $^{-1}_{-16}$	78	78.6	290	2	3	154	64.3	154.0	122.2	63.5	10	230.2	8	$^{1-1/8}_{-1/8}$	32	$^{+2/-0.5}_{-0.5}$	190	154	
4 $^{-1}_{-16}$	103	104.0	360	2	3	194	78.6	195.3	158.8	73.0	10	290.5	8	$^{1-3/8}_{-3/8}$	40	$^{+2/-0.5}_{-0.5}$	235	155	
7 $^{-1}_{-16}$	179	180.2	505	3	6	305	119.1	325.4	276.2	66.7	16	428.6	16	$^{1-1/2}_{-1/2}$	42	$^{+2/-0.5}_{-0.5}$	325	156	
20000 psi																			
1 $^{-13}_{-16}$	46	46.8	255	2	3	117	63.5	133.3	109.5	49.2	10	203.2	8	1	30	$^{+2/-0.5}_{-0.5}$	190	151	
2 $^{-1}_{-16}$	52	53.2	285	2	3	132	71.5	154.0	127.0	52.4	10	230.2	8	$^{1-1/8}_{-1/8}$	32	$^{+2/-0.5}_{-0.5}$	210	152	
2 $^{-9}_{-16}$	65	65.9	325	2	3	151	79.4	173.0	144.4	58.7	10	261.9	8	$^{1-1/4}_{-1/4}$	36	$^{+2/-0.5}_{-0.5}$	235	153	
3 $^{-1}_{-16}$	78	78.6	355	2	3	171	85.7	192.1	160.3	63.5	10	287.3	8	$^{1-3/8}_{-3/8}$	40	$^{+2/-0.5}_{-0.5}$	255	154	
4 $^{-1}_{-16}$	103	104.0	445	2	3	219	106.4	242.9	206.4	73.0	10	357.2	8	$^{1-3/4}_{-3/4}$	48	$^{+3/-0.5}_{-0.5}$	310	155	
7 $^{-1}_{-16}$	179	180.2	655	3	6	352	165.1	385.7	338.1	96.8	16	554.0	16	2	54	$^{+3/-0.5}_{-0.5}$	445	156	

Api Flange - Type 6bx Blind and Test Flanges



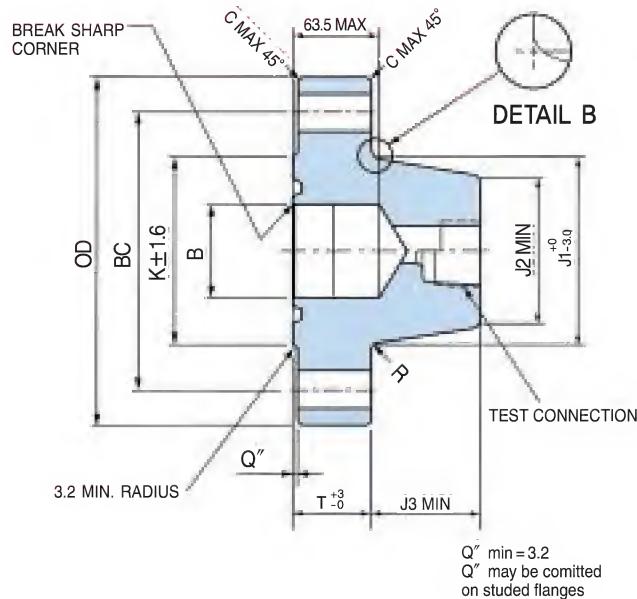
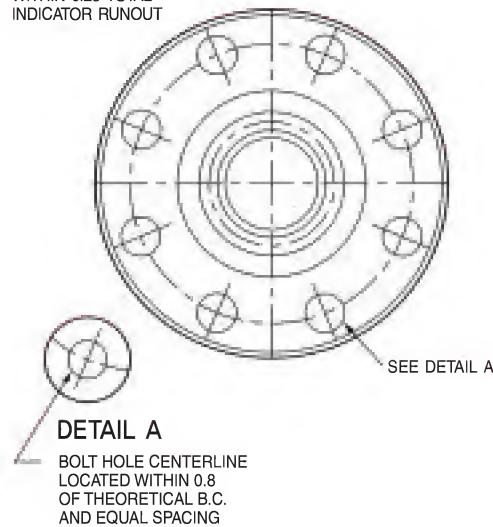
B TO RING GROOVE
MUST BE CONCENTRIC
WITHIN 0.25 TOTAL
INDICATOR RUNOUT



Basic Flange Dimensions													Bolting Dimensions						
Nominal Size of Flange	in.	mm	Maximum Bore	Outside Diameter of Flange	Tolerance	Maximum Chamfer	Diameter of Raised Face	Total Thickness of Flange	Large Diameter of Hub	Small Diameter of Hub	Length of Hub	Radius of Hub	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Diameter of Bolt Holes	Bolt Hole Tolerance	Minimum Length of Stud Bolts	Ring Number
			B	OD	OD	C	K	T	J1	J2	J3	R	BC	in.	mm	Lssb	BX		
10000 psi																			
1-13/16	46	46.8	190	2	3	105	42.1	88.9	65.1	48.4	10	146.0	8	3/4	23	+2/-0.5	130	151	
2-1/16	52	53.2	200	2	3	111	44.1	100.0	74.6	51.6	10	158.8	8	3/4	23	+2/-0.5	135	152	
2-9/16	65	65.9	230	2	3	132	51.2	120.7	92.1	57.1	10	184.2	8	7/8	25	+2/-0.5	155	153	
3-1/16	78	78.6	270	2	3	152	58.4	142.1	110.3	63.5	10	215.9	8	1	29	+2/-0.5	175	154	
4-1/16	103	104.0	315	2	3	185	70.3	182.6	146.0	73.0	10	258.8	8	1-1/8	32	+2/-0.5	205	155	
15000 psi																			
1-13/16	46	46.8	210	2	3	106	45.2	97.6	71.4	47.6	10	160.3	8	7/8	26	+2/-0.5	140	151	
2-1/16	52	53.2	220	2	3	114	50.8	111.1	82.6	54.0	10	174.6	8	7/8	26	+2/-0.5	150	152	
2-9/16	65	65.9	250	2	3	133	57.1	128.6	100.0	57.1	10	200.0	8	1	29	+2/-0.5	170	153	
3-1/16	78	78.6	290	2	3	154	64.3	154.0	122.2	63.5	10	230.2	8	1-1/8	32	+2/-0.5	190	154	
4-1/16	103	104.0	360	2	3	194	78.6	195.3	158.8	73.0	10	290.5	8	1-3/8	39	+2/-0.5	230	155	

Api Flange - Type 6bx Blind and Test Flanges

B TO RING GROOVE
MUST BE CONCENTRIC
WITHIN 0.25 TOTAL
INDICATOR RUNOUT



Basic Flange Dimensions													Bolting Dimensions							
Nominal Size of Flange	in.	mm	Maximum Bore	Outside Diameter of Flange	Tolerance	Maximum Chamfer	Diameter of Raised Face	Total Thickness of Flange	Large Diameter of Hub	Small Diameter of Hub	Length of Hub	Radius of Hub	Diameter of Bolt Circle	Number of Bolts	in.	mm	Lssb	BX	Ring Number	
20000 psi																				
1 $-\frac{13}{16}$	46	46.8	255	2	3	117	63.5	133.4	109.5	49.2	10	203.2	8	1	29	$+2/-0.5$	190	151		
2 $-\frac{1}{16}$	52	53.2	290	2	3	132	71.4	154.0	127.0	52.4	10	230.2	8	$1\frac{1}{8}$	32	$+2/-0.5$	210	152		
2 $-\frac{9}{16}$	65	65.9	325	2	3	151	79.4	173.0	144.5	58.7	10	261.9	8	$1\frac{1}{4}$	34	$+2/-0.5$	235	153		
3 $-\frac{1}{16}$	78	78.6	355	2	3	171	85.7	192.0	160.3	63.5	10	287.3	8	$1\frac{3}{8}$	38	$+2/-0.5$	255	154		
4 $-\frac{1}{16}$	103	104.0	445	2	3	219	106.4	242.9	206.4	73.0	10	357.2	8	$1\frac{3}{4}$	48	$+3/-0.5$	310	155		

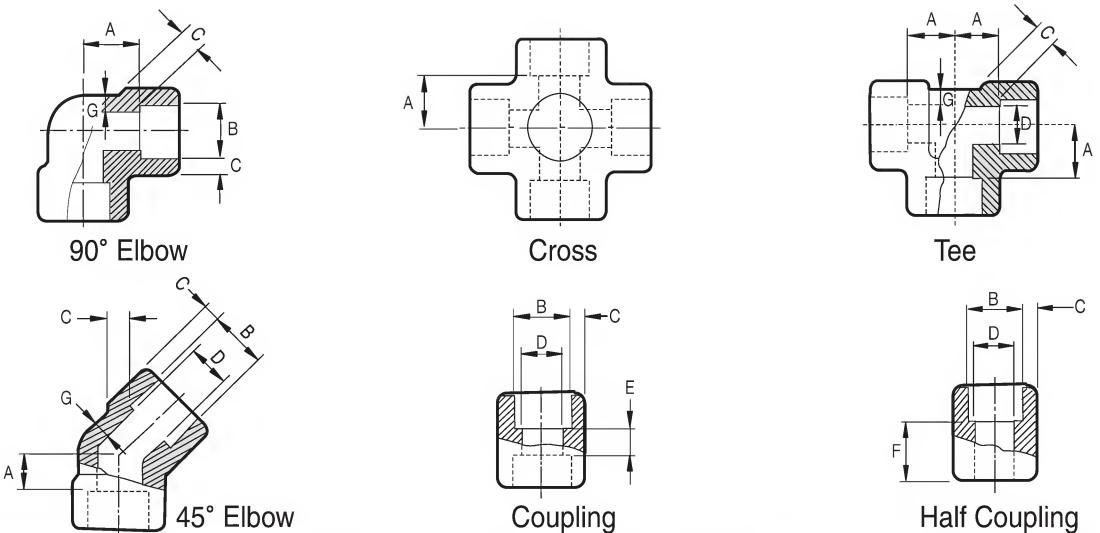
Forged Steel Pipe Fittings

- Forged Steel Socket Weld Fittings __ P96 ~ P102
- Forged Steel Threaded Fittings __ P103 ~ P108
- Forged Steel Outlet Fittings __ P109 ~ P112

Forged Steel Socket Weld Fittings

90° Elbows, 45° Elbows, Tee,
Cross, Coupling

3000# 6000# 9000#



ASME B16.11

(in millimeters)

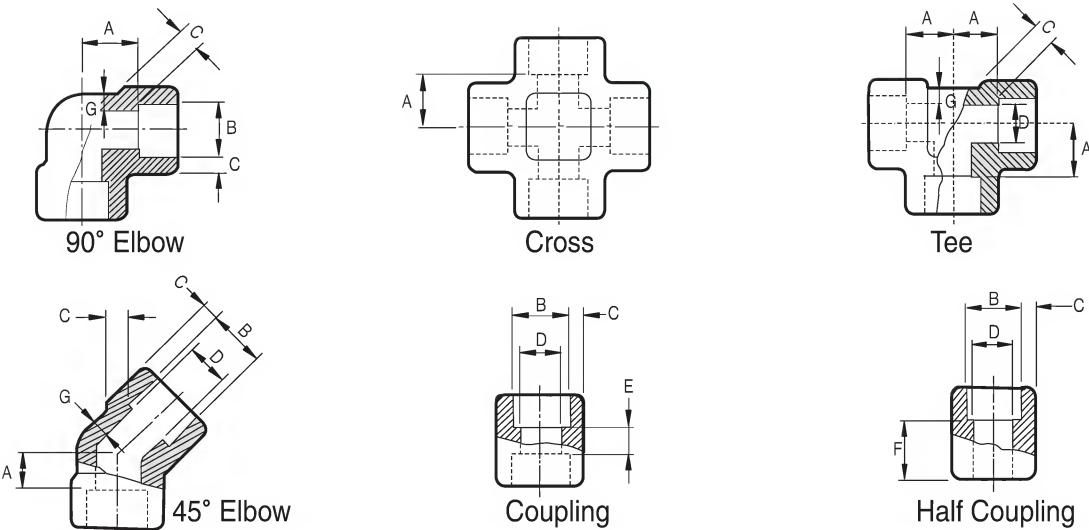
Nom. Pipe Size	Socket Bore Dia B	Bore Diameter of Fitting D			Socket Wall Thickness-C						Body Wall Thickness-G		
		Pressure Class Designation			Pressure Class Designation						Pressure Class Designation		
		3000	6000	9000	Ave.	Min.	Ave.	Min.	Ave.	Min.	3000	6000	9000
$\frac{1}{8}$	11.2	7.6	4.8		3.18	3.18	3.96	3.43			2.41	3.15	
	10.8	6.1	3.2										
$\frac{1}{4}$	14.6	10.0	7.1		3.78	3.30	4.60	4.01			3.02	3.68	
	14.2	8.5	5.6										
$\frac{3}{8}$	18.0	13.3	9.9		4.01	3.50	5.03	4.37			3.20	4.01	
	17.6	11.8	8.4										
$\frac{1}{2}$	22.2	16.6	12.5	7.2	4.67	4.09	5.97	5.18	9.35	8.18	3.73	4.78	7.47
	21.8	15.0	11.0	5.6									
$\frac{3}{4}$	27.6	21.7	16.3	11.8	4.90	4.27	6.96	6.04	9.78	8.56	3.91	5.56	7.82
	27.2	20.2	14.8	10.3									
1	34.3	27.4	21.5	16.0	5.69	4.98	7.92	6.93	11.38	9.96	4.55	6.35	9.09
	33.9	25.9	19.9	14.5									
$1\frac{1}{4}$	43.1	35.8	30.2	23.5	6.07	5.28	7.92	6.93	12.14	10.62	4.85	6.35	9.70
	42.7	34.3	28.7	22.0									
$1\frac{1}{2}$	49.2	41.7	34.7	28.7	6.35	5.54	8.92	7.80	12.70	11.12	5.08	7.14	10.15
	48.8	40.1	33.2	27.2									
2	61.7	53.5	43.6	38.9	6.93	6.04	10.92	9.50	13.84	12.12	5.54	8.74	11.07
	61.2	51.7	42.1	37.4									
$2\frac{1}{2}$	74.4	64.2			8.76	7.67					7.01		
	73.9	61.2											
3	90.3	79.5			9.52	8.30					7.62		
	89.8	76.4											
4	115.7	103.8			10.69	9.35					8.56		
	115.2	100.7											

• For Approx Weight See Page 127

Forged Steel Socket Weld Fittings

90° Elbows, 45° Elbows, Tee,
Cross, Coupling

3000# 6000# 9000#



ASME B16.11

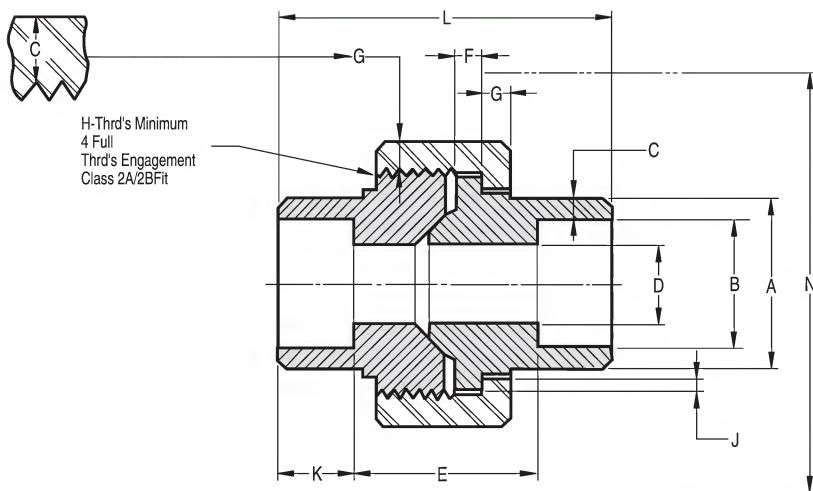
(in millimeters)

Nom. Pipe Size	Depth of Socket Min.-J	Center To Bottom of Socket-A						Laying Lengths	
		90° Elbows, Tees, and Crosses			45° Elbows			Couplings E	Half Couplings F
		Pressure Class Designation		3000	6000	9000	3000	6000	9000
1/8	9.5	12	12			9	9		8
		10	10			7	7		5
1/4	9.5	12	14.5			9	9		8
		10	12.5			7	7		5
3/8	9.5	15	17			9.5	12.5		9.5
		12	14			6.5	9.5		3.5
1/2	9.5	17	20.5	27	12.5	14	17	12.5	24
		14	17.5	24	9.5	11	14	6.5	21
5/8	12.5	21	24	30	14.5	15.5	20.5	12.5	25.5
		18	21	27	11.5	12.5	17.5	6.5	22.5
1	12.5	24.5	29	34	16	19.5	22.5	16.5	30.5
		20.5	25	30	12	15.5	18.5	8.5	26.5
1 1/4	12.5	29	34	37	19.5	22.5	24.5	16.5	32
		25	30	33	15.5	18.5	20.5	8.5	28
1 1/2	12.5	34	40	40	22.5	27.5	27.5	16.5	34
		30	36	36	18.5	23.5	23.5	8.5	30
2	16	40	43	56	27.5	30.5	30.5	23	43
		36	39	52	23.5	26.5	26.5	15	39
2 1/2	16	43.5			31			24	45.5
		38.5			26			14	40.5
3	16	59.5			34.5			24	47
		54.5			29.5			14	42
4	19	69			43.5			24	50.5
		64			38.5			14	45.5

Forged Steel Socket Weld Fittings

Union

3000#



MSS SP-83

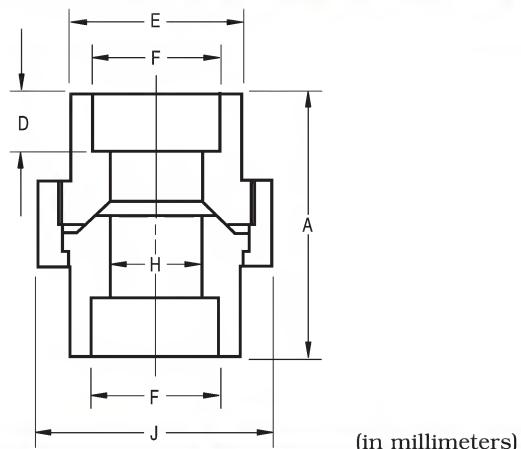
(in millimeters)

Nom. Pipe Size	Pipe End Min.	Socket Bore Dia.	Socket Wall Min.	Water Way Bore	Laying Length	Male Flange Min.	Nut Min.	Thrds. Per 25.4 Max.	Bearing Min.	Depth of Socket Min.	Length Assem. Nominal	Clear Assem. Nut		
													A	B
1/8	21.8	10.92 10.67	3.17	6.83 6.43	22.4 19.0	3.17	3.17	16	1.24	9.6	41.1	49.0		
1/4	21.8	14.22 13.97	3.30	9.85 9.45	22.4 19.0	3.17	3.17	16	1.24	9.6	41.4	49.0		
3/8	25.9	17.78 17.53	3.48	13.92 13.51	26.9 20.6	3.43	3.43	14	1.37	9.6	46.0	55.0		
1/2	31.2	21.84 21.59	4.06	17.47 17.07	26.9 20.6	3.68	3.68	14	1.50	9.6	49.0	57.0		
5/8	37.1	27.18 26.92	4.27	21.79 21.39	31.8 25.4	4.06	4.06	11	1.68	12.7	56.9	67.0		
1	45.5	34.04 33.78	4.95	28.14 27.74	34.3 26.2	4.57	4.44	11	1.85	12.7	62.0	79.0		
1 1/4	54.9	42.67 42.42	5.28	35.76 35.36	40.6 32.5	5.33	5.21	11	2.13	12.7	71.1	94.0		
1 1/2	61.5	48.77 48.51	5.54	41.61 41.20	42.2 34.0	5.84	5.59	10	2.31	12.7	76.5	111.0		
2	75.2	61.47 61.21	6.05	52.53 52.12	45.5 37.3	6.60	6.35	10	2.69	15.8	86.1	132.0		
2 1/2	91.7	74.17 73.66	7.65	64.72 64.31	61.7 52.1	7.49	7.11	8	3.07	15.8	102.4	148.0		
3	109.2	90.17 89.66	8.31	77.67 77.27	63.8 53.6	8.25	8.00	8	3.53	15.8	109.0	175.0		

Forged Steel Socket Weld Fittings

Union

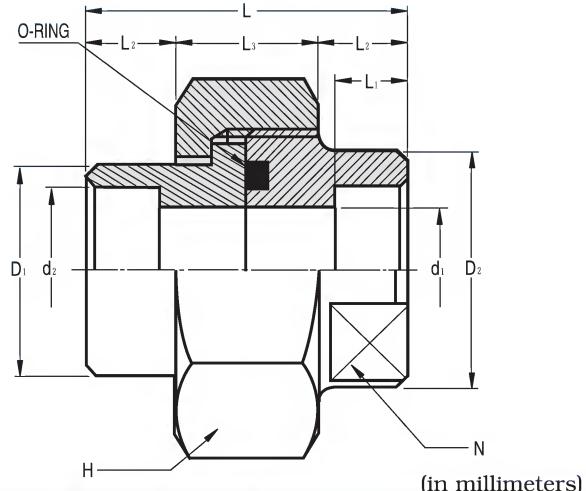
3000# 6000#



MSS SP-83

Nom. Pipe Size	A		D		E		F		H		J(Flat)		Unit weight (kg)	
	3000	6000	3000	6000	3000	6000	3000	6000	3000	6000	3000	6000	3000	6000
1/4	45	51	9.5	9.5	21	24.5	14.3	14.3	7.8	6.5	32	38	0.23	0.25
5/8	51	54	9.5	9.5	24.5	31.5	17.8	17.8	10.9	9	38	46	0.35	0.42
1/2	54	57	9.5	9.5	31.5	41.5	22.2	22.2	14.3	12.3	46	51	0.40	0.85
3/4	57	64	13	13	37.5	41.5	27.7	27.7	19.4	16.2	51	60	0.50	1.00
1	64	81	13	13	44.5	48.8	34.5	34.5	25.0	21.2	60	72	0.70	1.30
1 1/4	72	80	13	13	54	56	43.2	43.2	32.9	29.9	72	77	1.20	2.00
1 1/2	80	89	13	13	61.5	69	49.1	49.1	38.4	34.4	80	94	1.50	3.80
2	89	110	16	16	74.5	90	61.1	61.1	49.5	43.1	94	120	2.58	6.40

Union(O -Ring Type)



Nom Size	d ₁	d ₂	D ₁	D ₂	L ₁	L ₂	L ₃	L	N	H	O-RING
1/4	10	14.3	22	24	10	10	18	38	21	35HEX	P18
5/8	12	17.8	27	30	10	10	18	38	26	41HEX	P20
1/2	16	22.2	32	35	12	12	20	44	32	46HEX	G25
3/4	20	27.7	37	41	12	12	26	50	38	54HEX	G30
1	25	34.5	44	48	15	15	26	56	44	63HEX	G35
1 1/4	32	43.2	54	58	15	15	30	60	54	75HEX	G45
1 1/2	38	49.1	63	65	18	18	36	72	60	800CT	G50
2	48	61.1	76	80	18	18	36	72	75	950CT	G65

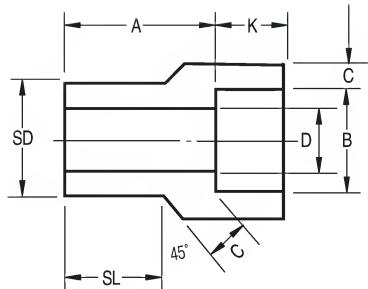
Rating Pressure:210kg/cm²

Temperature:120 ° Max

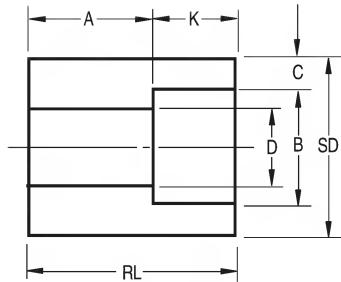
Forged Steel Socket Weld Fittings

Reducer Insert

3000# 6000#



Type 1



Type 2⁽¹⁾

MSS SP-79

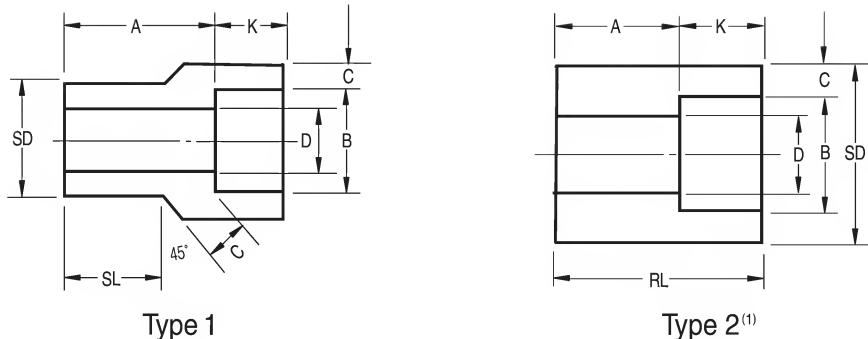
(in millimeters)

Nom. Pipe Size	Type		Socket		Shank Dia SD	Laying Length A		Bore D		Wall Min. C		Length Min.			
			3M	6M		3M	6M	3M	6M	3M	6M	3M	3M	6M	3M	6M
	3/8 X 1/4	1	1	14.22	9.52	17.14	19.0	20.6	9.14	6.35	3.78	4.60	14.22	15.75	
1/2 X 3/8	1	1	17.65	9.52	21.34	20.6	22.2	12.45	9.14	4.01	5.03	15.75	17.27		
X 1/4	2	1	14.22	9.52	21.34	15.8	20.6	9.14	6.35	3.78	4.60	17.27	17.27		
3/4 X 1/2	1	1	21.84	9.52	26.67	22.2	25.4	15.75	11.68	4.67	5.97	17.53	19.05		
X 3/8	2	1	17.65	9.52	26.67	15.8	22.2	12.45	9.14	4.01	5.03	19.05	26.92		
X 1/4	2	2	14.22	9.52	26.67	17.5	22.2	9.14	6.35	3.78	4.60	26.92	29.97		
1 X 3/4	1	1	27.18	12.70	33.35	23.8	28.5	20.83	15.49	4.90	6.96	19.05	20.57		
X 1/2	2	2	21.84	9.52	33.35	15.8	20.6	15.75	11.68	4.67	5.97	20.57	28.45		
X 3/8	2	2	17.65	9.52	33.35	17.5	22.2	12.45	9.14	4.01	5.03	28.45	33.27		
X 1/4	2	2	14.22	9.52	33.35	19.0	23.8	9.14	6.35	3.78	4.60	28.45	33.27		
1 1/4 X 1	1	1	33.86	12.70	42.16	25.4	30.2	26.67	20.57	5.69	7.92	20.57	22.35		
X 3/4	2	2	27.18	12.70	42.16	17.5	20.6	20.88	15.49	4.90	6.96		31.75	34.80	
X 1/2	2	2	21.84	9.52	42.16	19.0	22.2	15.75	11.68	4.67	5.97		31.75	34.80	
X 3/8	2	2	17.65	9.52	42.16	20.6	23.8	12.45	9.14	4.01	5.03		31.75	34.80	
X 1/4	2	2	14.22	9.52	42.16	22.2	25.4	9.14	6.35	3.78	4.60		31.75	34.80	
1 1/2 X 1 1/4	1	1	42.67	12.70	48.26	28.5	35.1	35.05	29.46	6.07	7.92	22.22	25.40		
X 1	2	1	33.86	12.70	48.26	17.5	28.5	26.67	20.57	5.69	7.92		25.40	33.27	
X 3/4	2	2	27.18	12.70	48.26	19.0	25.4	20.83	15.49	4.90	6.96		33.27	39.62	
X 1/2	2	2	21.84	9.52	48.26	20.6	26.9	15.75	11.68	4.67	5.97		33.27	39.62	
X 3/8	2	2	17.65	9.52	48.26	22.2	28.5	12.45	9.14	4.01	5.03		33.27	39.62	
2 X 1 1/2	1	1	48.77	12.70	60.32	31.7	46.0	40.89	34.04	6.35	8.91	25.40	39.62		
X 1 1/4	2	2	42.67	12.70	60.32	20.6	23.8	34.92	29.46	6.07	7.92		38.10	45.97	
X 1	2	2	33.91	12.70	60.32	22.2	25.4	26.67	20.83	5.69	7.92		38.10	45.97	
X 3/4	2	2	27.18	12.70	60.32	23.8	26.9	20.83	15.49	4.90	6.96		38.10	45.97	
X 1/2	2	2	21.84	9.52	60.32	25.4	28.5	15.87	11.68	4.67	5.97		38.10	45.97	

Forged Steel Socket Weld Fittings

Reducer Insert

3000# 6000#



MSS SP-79

(in millimeters)

Nom. Pipe Size	Type		Socket		Shank Dia SD	Laying Length A		Bore D		Wall Min. C		Length Min.	
	3M	6M	Dia. B	Depth Min. K		3M	6M	3M	6M	3M	6M	3M	6M
2½ × 2	1	1	61.24	15.87	73.02	46.0	42.8	52.58	42.92	6.93	10.92	38.10	31.75
× 1½	2	2	48.77	12.70	73.02	34.9	X	40.89	X	6.35	X		53.85
× 1¼	2	2	42.67	12.70	73.02	36.5	X	34.92	X	6.07	X		53.85
× 1	2	2	33.91	12.70	73.02	38.1	X	26.67	X	5.69	X		53.85
× ¾	2	2	27.18	12.70	73.02	39.6	X	20.83	X	4.90	X		53.85
3 × 2½	1	X	74.01	15.87	88.90	38.1	X	62.74	X	8.76	X	31.75	X
× 2	2	X	61.24	15.87	88.90	25.4	X	52.58	X	6.93	X		47.50
× 1½	2	X	48.77	12.70	88.90	28.5	X	40.89	X	6.35	X		47.50
× 1¼	2	X	42.67	12.70	88.90	30.1	X	34.92	X	6.07	X		47.50
× 1	2	X	33.91	12.70	88.90	31.7	X	26.67	X	5.69	X		47.50
4 × 3	2	X	89.99	15.87	114.30	33.2	X	77.99	X	9.52	X		60.32
× 2½	2	X	74.01	15.87	114.30	38.1	X	62.74	X	8.76	X		60.32
× 2	2	X	61.24	15.87	114.30	38.1	X	52.58	X	6.93	X		60.32
× 1½	2	X	48.77	12.70	114.30	41.2	X	40.89	X	6.35	X		60.32
× 1¼	2	X	42.67	12.70	114.30	42.8	X	34.92	X	6.07	X		60.32

(1) At the option of the manufacturer Type 2 Reducers may be furnished in Type 1 configuration

(2) 3M and 6M symbols denote 3000 and 6000 classes.

TOLERANCES

Laying Length A- Sizes $\frac{3}{8}$ " thru $\frac{3}{4}$ " +or-1.52mm

Sizes 1 " thru 2 " +or-2.03mm

Sizes 2½ " thru 4 " +or-2.54mm

Socket Dia. B- Sizes $\frac{3}{8}$ " thru 2 " +or-0.13mm

Sizes 2½ " thru 4 " +or-0.20mm

Bore D-

Sizes $\frac{3}{8}$ " thru 2" +or-0.76mm

Sizes 2½ " thru 4 " +or-1.52mm

Sizes $\frac{3}{4}$ " thru 1½ " +or-0.25mm

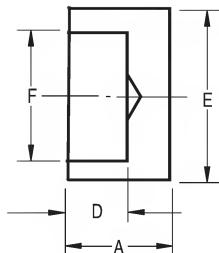
Sizes 2 " thru 3 " +or-0.51mm

Sizes 4 " +or-0.76mm

Forged Steel Socket Weld Fittings

Cap

3000# 6000#



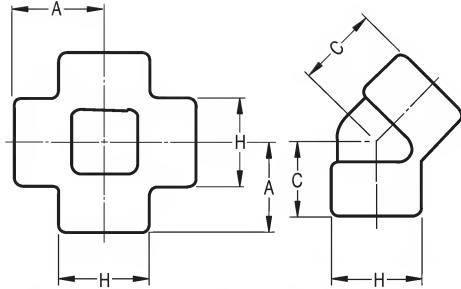
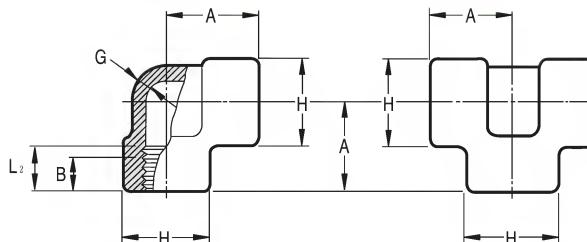
(in millimeters)

Nom. Pipe Size	A		E		F		D		Unit weight (kg)	
	3000	6000	3000	6000	3000	6000	3000	6000	3000	6000
1/4	16	18	22	23	14.3	14.3	9.5	9.5	0.04	0.04
5/8	16	18	25.5	26.5	17.8	17.8	9.5	9.5	0.05	0.06
1/2	17.5	25.5	31.5	34	22.2	22.2	9.5	9.5	0.07	0.15
3/4	22.5	32	37	41	27.7	27.7	13	13	0.13	0.27
1	29	35.5	45.5	50	34.5	34.5	13	13	0.21	0.45
1 1/4	29	39	55	58.5	43.2	43.2	13	13	0.37	0.67
1 1/2	32	40	61.5	66.5	49.1	49.1	13	13	0.60	0.89
2	42	50	75	83	61.1	61.1	16	16	0.99	1.75
2 1/2	42	55	91.5	98	77.1	77.1	16	16	1.50	2.66
3	42	60	109	118	90.1	90.1	16	16	2.30	4.33
4	50	70	138	149	115.3	115.3	20	20	4.00	7.91

Forged Steel Threaded Fittings

90° Elbows, 45° Elbows Tees

2000# 3000# 6000#



(in millimeters)

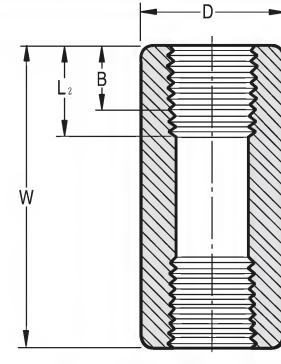
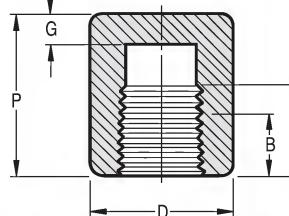
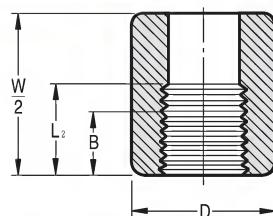
ASME B16.11

Nominal Pipe Size	Center to End Elbows Tees Crosses A			Center to End 45° Elbows C			Outside Diameter of Band H			Minimum Wall Thickness G			Length of Thread, Min	
	2000	3000	6000	2000	3000	6000	2000	3000	6000	2000	3000	6000	B	L ₂
1/8	21	21	25	17	17	19	22	22	25	3.18	3.18	6.35	6.4	6.7
1/4	21	25	28	17	19	22	22	25	33	3.18	3.30	6.60	8.1	10.2
3/8	25	28	33	19	22	25	25	33	38	3.18	3.51	6.98	9.1	10.4
1/2	28	33	38	22	25	28	33	38	46	3.18	4.09	8.15	10.9	13.6
5/8	33	38	44	25	28	33	38	46	56	3.18	4.32	8.53	12.7	13.9
1	38	44	51	28	33	35	46	56	62	3.68	4.98	9.93	14.7	17.3
1 1/4	44	51	60	33	35	43	56	62	75	3.89	5.28	10.59	17.0	18.0
1 1/2	51	60	64	35	43	44	62	75	84	4.01	5.56	11.07	17.8	18.4
2	60	64	83	43	44	52	75	84	102	4.27	7.14	12.09	19.0	19.2
2 1/2	76	83	95	52	52	64	92	102	121	5.61	7.65	15.29	23.6	28.9
3	86	95	106	64	64	79	109	121	146	5.99	8.84	16.64	25.9	30.5
4	106	114	114	79	79	79	146	152	152	6.55	11.18	18.67	27.7	33.0

• For Approx Weight See Page 122

Coupling, Half Coupling, Cap

3000# 6000#



(in millimeters)

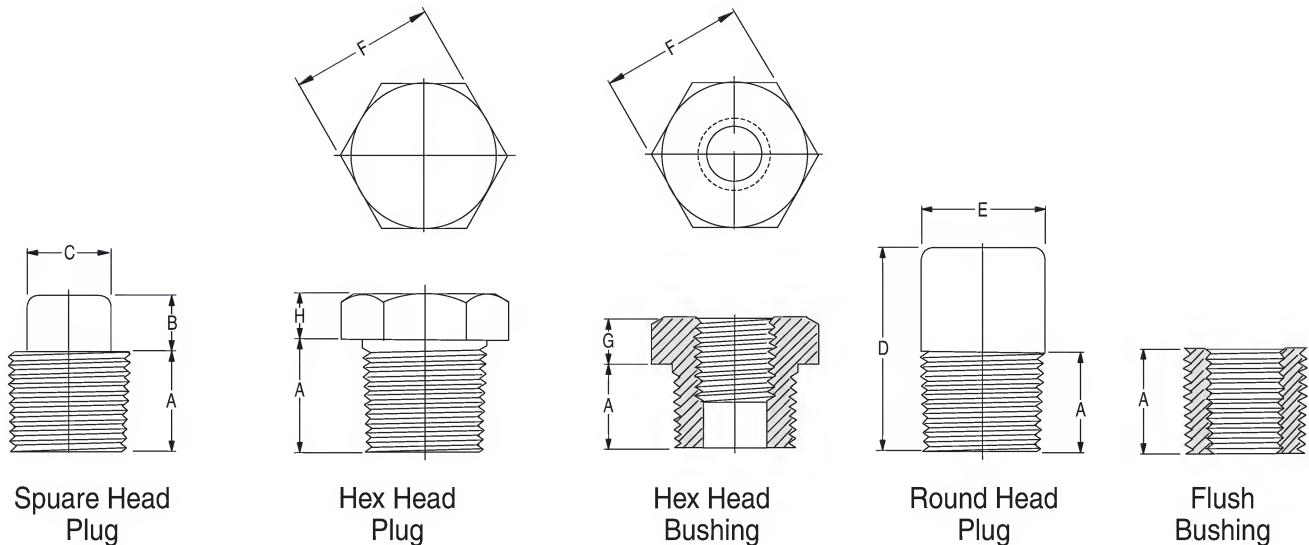
ASME B16.11

Nominal Pipe Size	End to End Couplings W		End to End Caps P		Outside Diameter D		End Wall Thickness G Min.		Length of Thread, Min		
	3000 & 6000	3000	6000	3000	6000	3000	6000	3000	6000	B	L ₂
1/8	32	19		16	22	4.8		4.8		6.4	6.7
1/4	35	25	27	19	25	4.8	6.4	6.4	8.1	10.2	
3/8	38	25	27	22	32	4.8	6.4	6.4	9.1	10.4	
1/2	48	32	33	28	38	6.4	7.9	7.9	10.9	13.6	
5/8	51	37	38	35	44	6.4	7.9	7.9	12.7	13.9	
1	60	41	43	44	57	9.7	11.2	11.2	14.7	17.3	
1 1/4	67	44	46	57	64	9.7	11.2	11.2	17.0	18.0	
1 1/2	79	44	48	64	76	11.2	12.7	12.7	17.8	18.4	
2	86	48	51	76	92	12.7	15.7	15.7	19.0	19.2	
2 1/2	92	60	64	92	108	15.7	19.0	19.0	23.6	28.9	
3	108	65	68	108	127	19.0	22.4	22.4	25.9	30.5	
4	121	68	75	140	159	22.4	28.4	28.4	27.7	33.0	

• For Approx Weight See Page 122

Forged Steel Threaded Fittings

Plug, Bushing



ASME B16.11

(in millimeters)

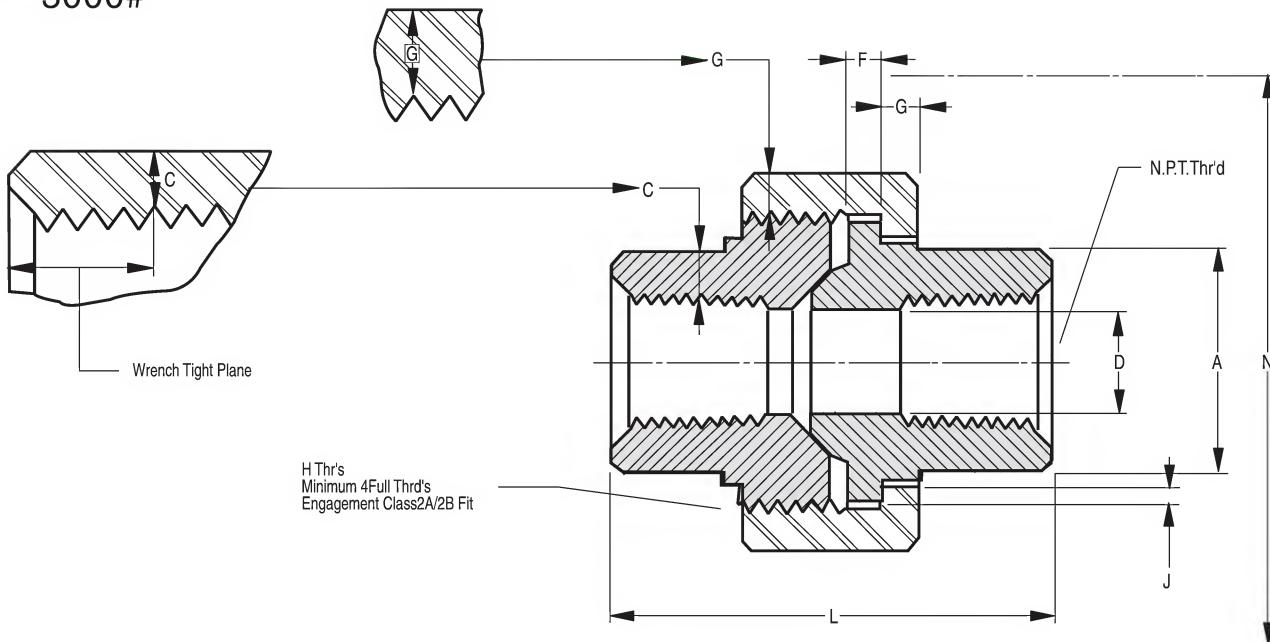
Nominal Pipe Size	Length (Minimum) A	Plugs Square Head		Plugs Round Head		Hex Plugs & Bushings		
		Height of Square (Minimum) B	Width Flats (Minimum) C	Nominal Diameter of Head E	Length (Minimum) D	Width Flats (Nominal) F	Bushing G	Plug H
1/8	10.0	6	7.0	10	35	11.0		6
1/4	11.0	6	10.0	14	41	16.0	3	6
3/8	13.0	8	11.0	18	41	18.0	4	8
1/2	14.0	10	14.0	21	44	22.0	5	8
5/8	16.0	11	16.0	27	44	27.0	6	10
1	19.0	13	21.0	33	51	36.0	6	10
1 1/4	21.0	14	24.0	43	51	46.0	7	14
1 1/2	21.0	16	28.0	48	51	50.0	8	16
2	22.0	18	32.0	60	64	65.0	9	18
2 1/2	27.0	19	36.0	73	70	75.0	10	19
3	28.0	21	41.0	89	70	90.0	10	21
4	32.0	25	65.0	114	76	115.0	13	25

• For Approx Weight See Page 126

Forged Steel Threaded Fittings

Union

3000#



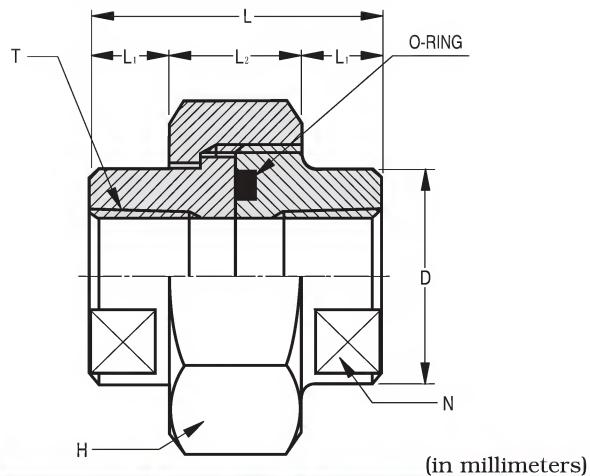
MSS SP-83

(in millimeters)

Nom. Pipe Size	Pipe End Min. A	Wall Min. C	Water Way Bore D	Male Flange Min. F	Nut Min. G	Thrd. Per 25.4 Max. H	Bearing Min. J	Length Assem. Nominal L	Clear Assem. Nut N
1/8	21.8	3.18	6.83 6.43	3.17	3.2	16	1.24	41.4	49.0
1/4	21.8	3.30	9.85 9.45	3.17	3.2	16	1.24	41.4	49.0
3/8	25.9	3.50	13.92 13.51	3.43	3.4	14	1.37	46.0	55.0
1/2	31.2	4.09	17.47 17.07	3.68	3.7	14	1.50	49.0	57.0
5/8	37.1	4.27	21.79 21.39	4.06	4.1	11	1.68	56.9	67.0
1	45.4	4.99	28.14 27.74	4.57	4.4	11	1.85	62.0	79.0
1 1/4	54.9	5.28	35.76 35.36	5.33	5.2	11	2.13	71.1	94.0
1 1/2	61.5	5.54	41.61 41.20	5.84	5.6	10	2.31	76.4	111.0
2	75.2	6.05	52.53 52.12	6.60	6.4	10	2.69	86.1	132.0
2 1/2	91.7	7.68	64.72 64.31	7.49	7.1	8	3.07	102.4	148.0
3	109.2	8.31	77.67 77.27	8.25	8.0	8	3.53	109.0	175.0

Forged Steel Threaded Fittings

Union(O -Ring Type)



Nom Size (PT)	D	L ₁	L ₂	L	N	H	O-Ring
1/4	22	10	18	38	19	35 HEX	P18
3/8	27	10	18	38	23	41 HEX	P20
1/2	32	12	20	44	29	46 HEX	G25
3/4	38	12	26	50	34	54 HEX	G30
1	47	15	26	56	41	63 HEX	G35
1 1/4	56	15	30	60	51	75 HEX	G45
1 1/2	63	18	36	72	60	80 OCT	G50
2	76	18	36	72	71	95 OCT	G65

Rating Pressure: 201 kg/cm²

Temperature: 120°C Max.

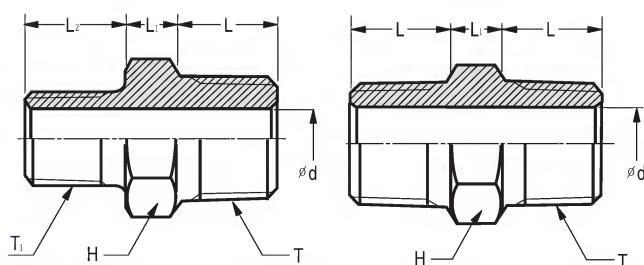
Forged Steel Threaded Fittings

Union

3000# 6000#

(in millimeters)

Nom. Size $T \times T_1$	d	H	L	L_1	L_2	Unit Weight (kg)
$3/8 \times 1/4$	7.1	19	14	8	14	0.05
$1/2 \times 1/4$	7.1	24	19	9	14	0.09
$1/2 \times 3/8$	8.9	24	19	9	14	0.09
$3/4 \times 1/4$	7.1	30	19	10	14	0.15
$3/4 \times 3/8$	8.9	30	19	10	14	0.15
$3/4 \times 1/2$	11.9	30	19	10	19	0.15
$1 \times 3/8$	8.9	36	24	11	14	0.27
$1 \times 1/2$	11.9	36	24	11	19	0.27
$1 \times 3/4$	16.0	36	24	11	19	0.27
$1-1/4 \times 1/2$	11.9	46	24	12	19	0.45
$1-1/4 \times 3/4$	16.0	46	24	12	19	0.45
$1-1/4 \times 1$	20.1	46	24	12	24	0.45
$1-1/2 \times 3/4$	16.0	50	25	14	19	0.62
$1-1/2 \times 1$	20.1	50	25	14	24	0.62
$1-1/2 \times 1-1/4$	27.9	50	25	14	24	0.62
2×1	20.1	65	26	16	24	1.03
$2 \times 1-1/4$	27.9	65	26	16	24	1.03
$2 \times 1-1/2$	32.0	65	26	16	25	1.03
$2-1/2 \times 1-1/4$	27.9	80	38	18	24	1.51
$2-1/2 \times 1-1/2$	32.0	80	38	18	25	1.51
$2-1/2 \times 2$	39.9	80	38	18	26	1.51
$3 \times 1-1/2$	32.0	95	40	20	25	2.22
3×2	39.9	95	40	20	26	2.22
$3 \times 2-1/2$	55.1	95	40	20	38	2.22



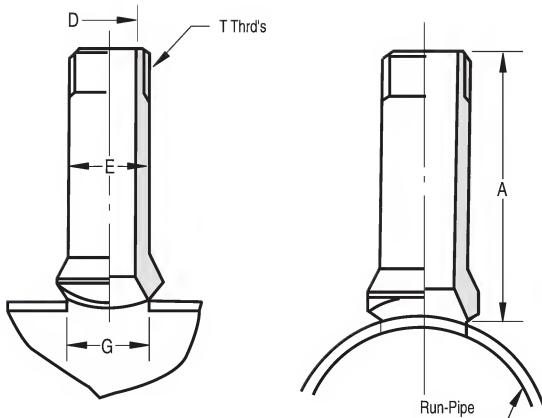
Nom. Size T	d	H	L	L_1	Unit Weight (kg)
1/8	4.1	12	10	6	0.03
1/4	7.1	17	14	8	0.04
3/8	8.9	19	14	8	0.05
1/2	11.9	24	19	9	0.09
3/4	16.0	30	19	10	0.15
1	20.1	36	24	11	0.27
1-1/4	27.9	46	24	12	0.45
1-1/2	32.0	50	25	14	0.62
2	39.9	65	26	16	1.03
2-1/2	55.1	80	38	18	1.51
3	65.0	95	40	20	2.22

Forged Steel Threaded Fittings

Nipple Outlet

3000#

Nom. Pipe Size	(in millimeters)					
	d	H	L	L ₁	L ₂	Unit Weight (kg)
36- $\frac{3}{4}$	$\frac{1}{2}$	88.9	23.9	14.0	21.3	0.36
36-1	$\frac{3}{4}$	88.9	30.2	18.8	26.7	0.56
36-1 $\frac{1}{4}$	1	88.9	36.6	24.4	33.3	0.84
36-1 $\frac{1}{2}$	$1\frac{1}{4}$	88.9	44.5	32.5	42.2	1.22
36-2	$1\frac{1}{2}$	88.9	50.8	38.1	48.3	2.00
36-2 $\frac{1}{2}$	2	88.9	65.0	49.3	60.5	3.12

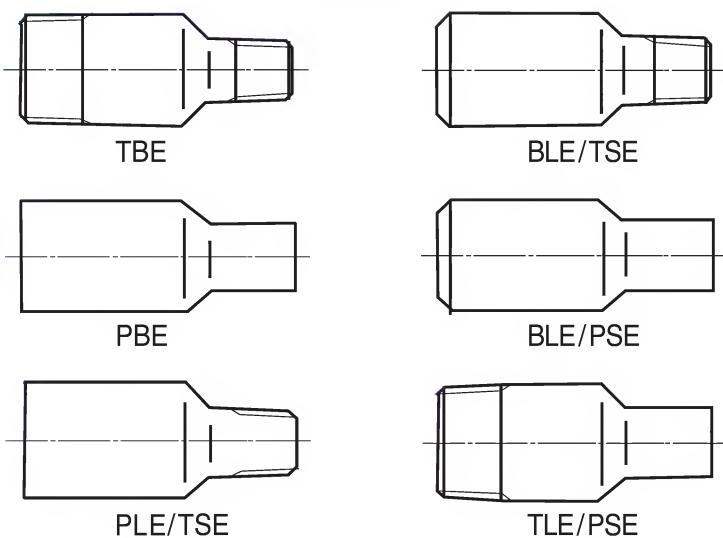


Swaged Nipple

Large end Size	Small end Size	Length (mm)
$\frac{1}{2}$	$\frac{3}{8} - \frac{1}{8}$	70
$\frac{3}{4}$	$\frac{1}{2} - \frac{1}{8}$	76
1	$\frac{3}{4} - \frac{1}{8}$	89
$1\frac{1}{4}$	$1 - \frac{1}{8}$	102
$1\frac{1}{2}$	$1\frac{1}{4} - \frac{1}{8}$	114
2	$1\frac{1}{2} - \frac{1}{8}$	165
$2\frac{1}{2}$	$2 - \frac{1}{8}$	178
3	$2\frac{1}{2} - \frac{1}{8}$	203
$3\frac{1}{2}$	$3 - \frac{1}{8}$	203
4	$3\frac{1}{2} - \frac{1}{8}$	229

TBE	Threaded both end
PBE	Plain both end
PLE/TSE	Plain large end-Threaded small end
BLE/TSE	Beveled large end-Threaded small end
BLE/PSE	Beveled large end-Plain small end
TLE/PSE	Threaded large end-Plain small end

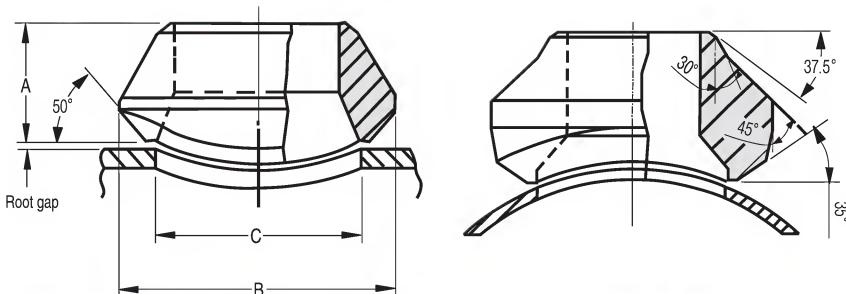
SHAPE



Forged Steel Outlet Fittings

Weld-outlets

STD(Sch 40), XS(Sch 80)



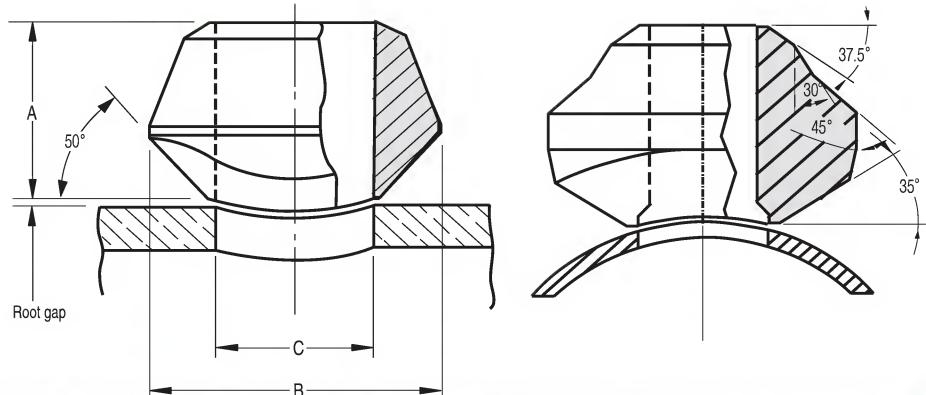
Outlet Size	A		B		C		APP'Weight(kg)	
	STD	XS	STD	XS	STD	XS	STD	XS
1/2	19.1	19.1	34.9	34.9	23.8	23.8	0.08	0.09
3/4	22.2	22.2	44.5	44.5	30.2	30.2	0.11	0.14
1	27.0	27.0	54.0	54.0	36.5	36.5	0.23	0.21
1 1/4	31.8	31.8	65.1	65.1	44.5	44.5	0.36	0.41
1 1/2	33.3	33.3	73.0	73.0	50.8	50.8	0.45	0.5
2	38.1	38.1	88.9	88.9	65.1	65.1	0.80	0.80
2 1/2	41.3	41.3	103.2	103.2	76.2	76.2	1.14	1.2
3	44.5	44.5	122.2	122.2	93.7	93.7	1.82	1.9
4	50.8	50.8	152.4	152.4	120.7	120.7	2.86	2.9
5	57.2	57.2	179.4	179.4	141.3	141.3	4.66	4.7
6	60.3	77.8	215.9	225.4	169.9	169.9	6.45	10.5
8	69.9	98.5	263.5	292.1	220.7	220.7	10.68	16.8
10	77.8	93.7	322.3	323.9	274.7	265.1	17.73	20.9
12	85.7	103.2	377.8	379.4	325.4	317.5	26.82	27.7
14	88.9	100.0	409.6	431.8	357.2	350.8	30.0	31.8
16	93.7	106.4	463.6	466.7	408.0	403.2	34.1	46.4
18	96.8	111.1	520.7	523.9	458.8	455.6	44.1	59.1
20	101.6	119.1	571.5	582.6	508.0	509.6	53.6	71.8
24	115.9	139.7	689.0	708.0	614.4	638.2	100.0	131.8
26	119.1	146.1	738.2	765.2	666.8	692.2	120.5	159.1

- Applicable Run Pipe Sizes are From out-Let Size to 36"
- Standard Weight Fittings are the Same as Schedule 40 Fittings Until 10" and Extra Strong Fittings are the Same as Schedule 80 Until 8"
- Pipe Schedule Numbers and Weight Designations are in Accordance With ASME B36.10M
- When Ordering Weld-outlets, Include the Quantity, Size(Run and Out-let), Description(Weld-outlets, Schedule Number) and Material

Forged Steel Outlet Fittings

Weld-outlets

Sch 160, XXS



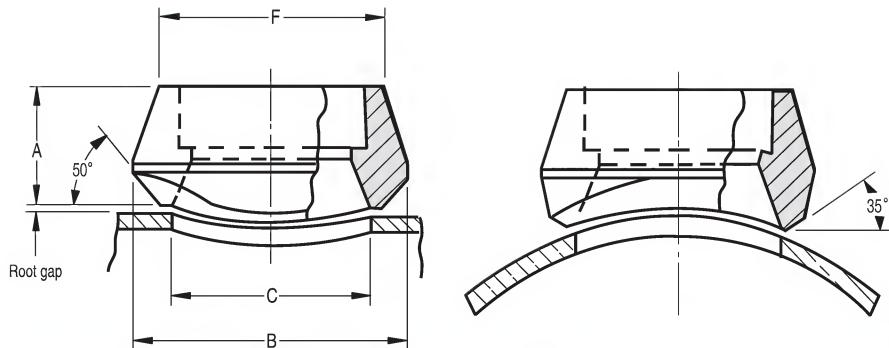
Outlet Size	A		B		C		APP'Weight(kg)	
	Sch160	XXS	Sch160	XXS	Sch160	XXS	Sch160	XXS
1/2	28.6	28.6	34.9	34.9	14.3	14.3	0.11	0.11
3/4	31.8	31.8	44.5	44.5	19.1	19.1	0.32	0.32
1	38.1	38.1	50.8	50.8	25.4	25.4	0.38	0.38
1 1/4	44.5	44.5	61.9	61.9	33.3	33.3	0.57	0.57
1 1/2	50.8	50.8	69.9	69.9	38.1	38.1	0.8	0.8
2	55.6	55.6	81.0	81.0	42.9	42.9	1.0	1.0
2 1/2	61.9	61.9	96.8	96.8	54.0	54.0	1.54	1.54
3	73.0	73.0	120.7	120.7	73.0	73.0	2.9	2.9
4	84.1	84.1	152.4	152.4	98.4	98.4	4.8	4.8
5	93.7	93.7	187.3	187.3	122.2	122.2	6.5	6.5
6	104.8	104.8	220.7	220.7	146.1	146.1	12.7	12.7
8	111.1	111.1	284.2	284.2	173.1	173.1	20.5	20.5
10	125.4	125.4	312.7	312.7	215.9	215.9	38.6	38.6

- Applicable Run Pipe Sizes are From out-Let Size to 36"
- Pipe Schedule Numbers and Weight Designations are in Accordance With ASME B36.10M
- When Ordering Weld-outlets, Include the Quantity, Size(Run and Out-let), Description(Weld-outlets, Schedule Number) and Material

Forged Steel Outlet Fittings

Socket-outlets

3000# 6000#



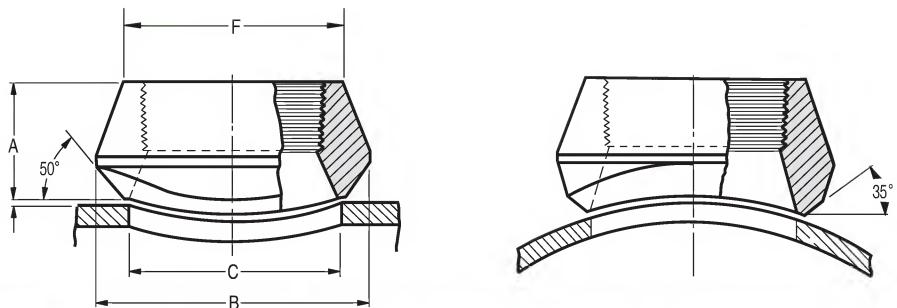
Outlet Size	A		B		C		F		APP'Weight(kg)	
	3000#	6000#	3000#	6000#	3000#	6000#	3000#	6000#	3000#	6000#
1/2	25.4	31.8	34.9	44.5	23.8	19.1	31.8	39.7	0.14	0.23
3/4	27.0	36.5	44.5	50.8	30.2	25.4	36.5	45.2	0.15	0.36
1	33.3	39.7	54.0	61.9	36.5	33.3	46.0	57.2	0.27	0.59
1 1/4	33.3	41.3	65.1	69.9	44.5	38.1	55.6	65.1	0.39	0.73
1 1/2	34.9	42.9	73.0	82.6	50.8	49.2	61.9	76.2	0.47	0.91
2	38.1	58.7	88.9	103.2	65.1	58.7	74.6	92.1	0.73	2.33
2 1/2	46.0	—	103.2	—	76.2	—	87.3	—	1.25	—
3	50.8	—	122.2	—	93.7	—	104.8	—	1.73	—
4	57.2	—	152.4	—	120.7	—	130.2	—	3.3	—

- Applicable Run Pipe Sizes are From out-Let Size to 36"
- For the 3000# and 6000# Socket-outlets and Thread-outlets, Inside Bore, Thread, Socket Bore and Socket Depth Dimensions are According to ASME B16.11
- Pipe Schedule Numbers and Weight Designations are in Accordance With ASME B36.10M
- When Ordering Weld-outlets, Include the Quantity, Size(Run and Out-let), Description(Weld-outlets, Schedule Number) and Material

Forged Steel Outlet Fittings

Thread-outlets

3000# 6000#



Out let Size	A		B		C		F		APP'Weight(kg)	
	3000#	6000#	3000#	6000#	3000#	6000#	3000#	6000#	3000#	6000#
1/2	25.4	31.8	34.9	44.5	23.8	19.1	31.8	39.7	0.11	0.20
3/4	27.0	36.5	44.5	50.8	30.2	25.4	36.5	46.0	0.16	0.34
1	33.3	39.7	54.0	61.9	36.5	33.3	46.0	57.2	0.28	0.56
1 1/4	33.3	41.3	65.1	69.9	44.5	38.1	55.6	65.1	0.41	0.71
1 1/2	34.9	42.9	73.0	82.6	50.8	49.2	61.9	76.2	0.45	0.89
2	38.1	52.4	88.9	103.2	65.1	69.9	74.6	92.1	0.8	2.30
2 1/2	46.0	—	103.2	—	76.2	—	87.3	—	1.36	—
3	50.8	—	122.2	—	93.7	—	104.8	—	1.98	—
4	57.2	—	152.4	—	120.7	—	130.2	—	3.22	—

- Applicable Run Pipe Sizes are From out-Let Size to 36"
- For the 3000# and 6000# Socket-outlets and Thread-outlets, Inside Bore, Thread, Socket Bore and Socket Depth Dimensions are According to ASME B16.11
- Pipe Schedule Numbers and Weight Designations are in Accordance With ASME B36.10M
- When Ordering Weld-outlets, Include the Quantity, Size(Run and Out-let), Description(Weld-outlets, Schedule Number) and Material

Dimension Tolerance

- ANSI Dimensional Tolerance __ P114
- ANSI Welding End Preparation __ P115
- JIS/ KS Dimensional Tolerance __ P116 ~P117
- JIS/ KS Welding End Preparations __ P118 ~P119
- MSS SP-43 Dimensional Tolerance __ P120

ANSI Dimensional Tolerance

Applicable Dimensional Tolerance for ASME Fittings
IN ACCORDANCE WITH ASME B16.9 - LATEST EDITION

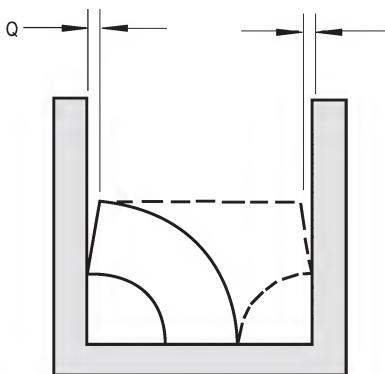
All Fittings				90° and 45° Elbows		Tees	Reducers Stub Ends	Caps	180° Returns									
Nominal Pipe Size	Outside Diameter at Bevel OD	Inside Diameter at End ID	Wall Thickness T	Center-to-End Dimension A, B	Center-to-End Dimension C, M	Overall Length H	Overall Length E	Center-to-Center Dimension P	Back-to-Face Dimension K	Alignment of Ends U								
1/8~2 1/2	+ 1.6 - 0.8	± 0.8	Not less than 87.5% of nominal thickness				± 3.0	± 6.0	± 1.0									
3~4	± 1.6	± 1.6																
5~8	+ 2.4 - 1.6																	
10~18	+ 4.0 - 3.2	± 3.2						± 6.0	± 10.0	± 2.0								
20~24																		
26~30	+ 6.4 - 4.8	± 4.8					± 3.0	± 3.0	± 6.0	± 2.0								
32~48							± 5.0	± 5.0										
*50~60	CIRCUMFERENTIAL LENGTH OF OD IN BEVEL END(S) :						± 9.5	± 9.5										
*62~70	0.7% OF OD						± 12.7	± 12.7	± 12.7	± 15.0								
*72~80	0.7% OF OD						± 15.9	± 15.9	± 15.9	—								
*82~100	CIRCUMFERENTIAL LENGTH OF OD IN BEVEL END(S) :						± 20.2	± 20.0	± 20.0	± 20.0								
*102~	± 0.5% OF OD						± 25.0	± 25.0	± 25.0	—								

NOTES : (1) Asterisk (*) to indicate TK CORP.'S maker STD.
(2) All fittings including fabricated type product.

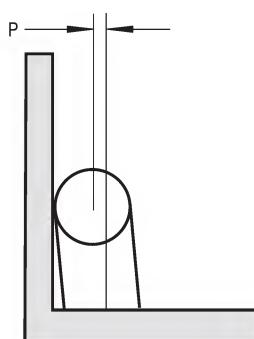
GENERAL NOTE : Dimensions are in mm.

NOTES :

- (1) Out-of-round is the sum of absolute values of plus and minus tolerance.
- (2) This tolerance may be exceeded in localized areas of formed fittings where increased wall thickness is required to meet design requirements of para 2.2
- (3) The inside diameter and the nominal wall thicknesses at ends are to be specified by the purchaser
- (4) Unless otherwise specified by the purchaser, these tolerances apply to the nominal inside diameter, which equals the difference between the nominal outside diameter and twice the nominal wall thickness.

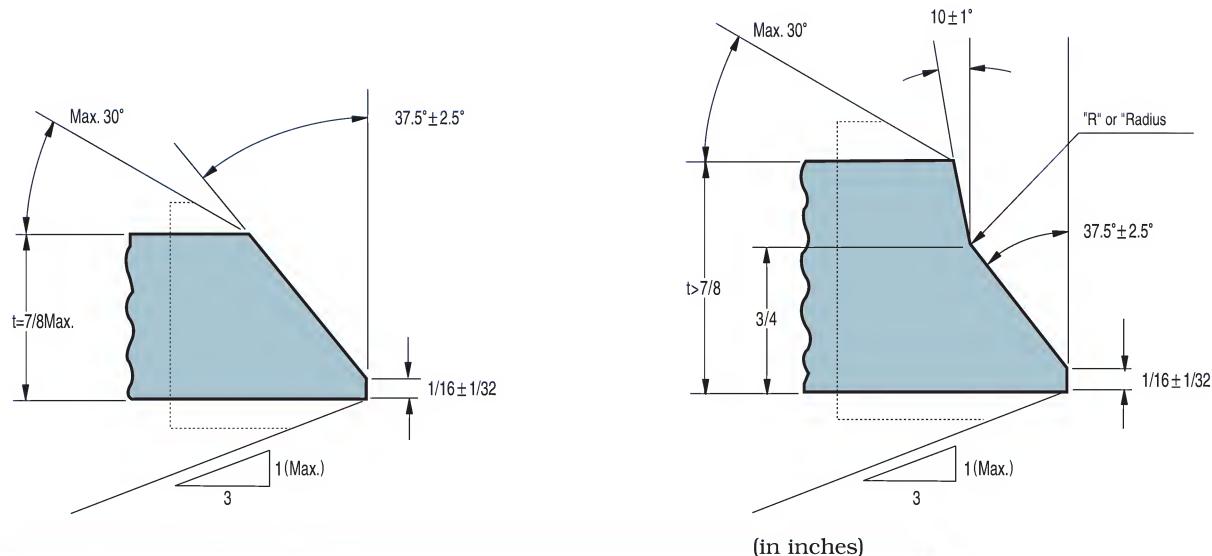


Angularity off Angle



Off Plane

ANSI Welding End Preparation



Nominal Pipe Wall Thickness(t)	End Preparation
Less than x*	Cut Square or slightly chamfer, at Mfr's option
x* to 7/8 incl.	Plain bevel as in sketch "a" above
more than 7/8	Compound bevel as in sketch "b" above

*x=3/16 for carbon steel, ferritic alloy steel or wrought iron;
1/8 for austenitic alloy steel

Notes : 1. End preparations are in accordance with ASME B16.9
2. End preparations conforming to customer specifications will be specially manufactured upon consultation.

$$\text{ASME B 16.9} ; P = \frac{2St}{D}$$

where,

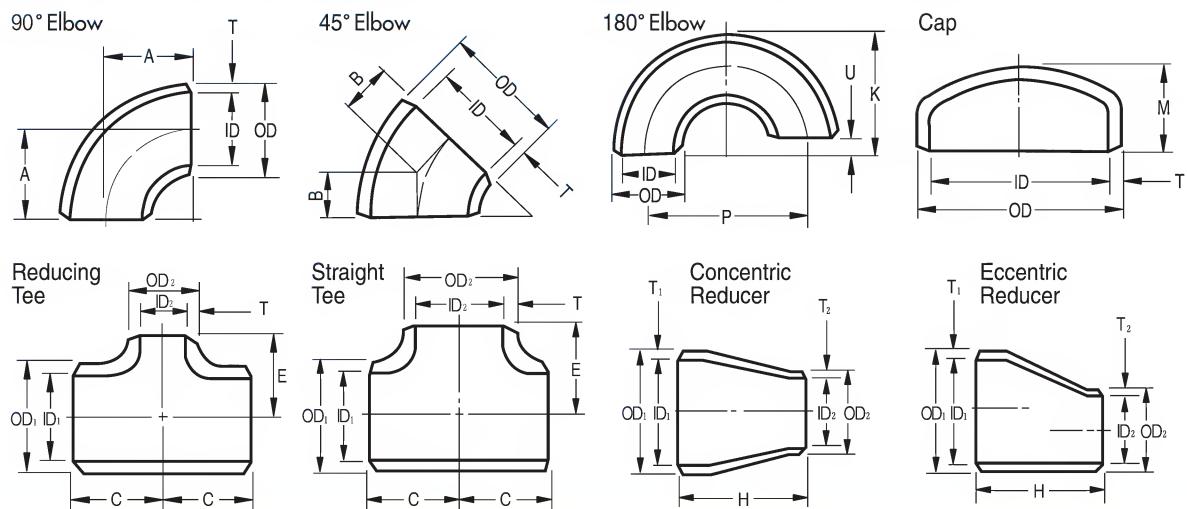
P=Computed proof of test pressure

S=Actual tensile strength of the test fitting (determined on a specimen representative of the test fitting)

t=Nominal pipe wall thickness of the pipe that the fitting marking identifies

D=Specified outside diameter of pipe

JIS/ KS Dimensional Tolerance



SteelButt-Welding Pipe Fittings For Ordinary Use

KS B1522 JIS B2311

(in millimeters)

Type of Pipe Fitting	Nominal Diameter				
	$\frac{1}{2}$ - $2\frac{1}{2}$	3-4	5-8	10-18	20
	Tolerance				
All Pipe Fitting	(OD)	± 2	± 2.5	± 3.5	$+5 -4.5$
	(ID)	± 2	± 2.5	± 3.5	± 4.5
	(T)			$+Not specified -15\%$	
90° Elbow 45° Elbow	(A, B)	± 2.0		± 3.2	
180° Elbow	(P)	± 6.4		± 9.5	
	(K)		± 6.4		
	(U)	1.6		3.2	
Reducer	(H)	± 2.0		± 3.2	
TEE	(C, E)	± 2.0		± 3.2	
CAP	(M)	± 3.2		± 6.4	

SteelButt-Welding Pipe Fittings For Special Use

KS B1541 JIS B2312

(in millimeters)

Type of Pipe Fitting	Nominal Diameter				
	$\frac{1}{2}$ - $2\frac{1}{2}$	3-4	5-8	10-18	20
	Tolerance				
All Pipe Fitting	(OD)	± 1.6 -0.8	± 1.6	± 2.4 -1.6	$+4 -3.2$
	(ID)	± 0.8		± 1.6	± 3.2
	(T)			$+Not specified -12.5\%$	
90° Elbow 45° Elbow	(A, B)	± 1.6			± 2.4
180° Elbow	(P)	± 6.4			± 9.5
	(K)		± 6.4		
	(U)	1.6			3.2
Reducer	(H)	± 1.6			± 2.4
TEE	(C, E)	± 1.6			± 2.4
CAP	(M)	± 3.2		± 6.4	



Steel Plate Butt-Welding Pipe Fittings

KS B1543 / JIS B2313

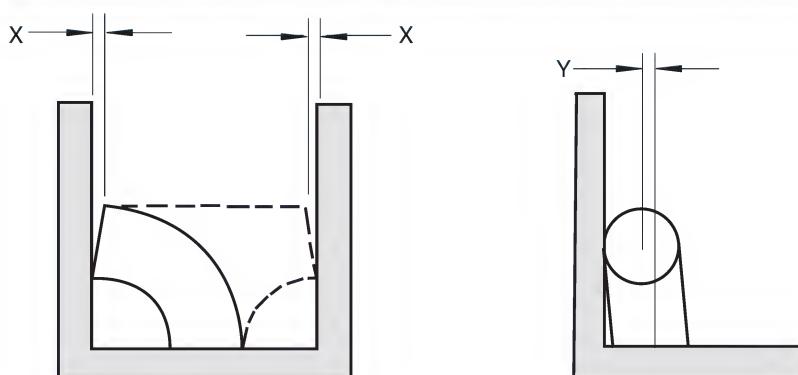
(in millimeters)

Type of Pipe Fitting		Nominal Diameter					
		$\frac{1}{2}$ - $2\frac{1}{2}$	3-4	5-8	10-18	20-24	32-48
		Tolerance					
All Pipe Fitting	(OD)	± 1.6 -0.8	± 1.6	± 2.4 -1.6	+4 -3.2		+6.4 -4.8
	(ID)	± 0.8		± 1.6	± 3.2		± 4.8
	(T)				+Not specified -12.5%		
90° Elbow 45° Elbow	(A, B)		± 1.6		± 2.4	± 3.2	± 4.8
180° Elbow	(P)		± 6.4		± 9.5		-
	(K)			± 6.4			-
	(U)		1.6		3.2		-
Reducer	(H)		± 1.6		± 2.4		± 4.8
TEE	(C, E)		± 1.6		± 2.4	± 3.2	± 4.8
Outside of end Peripheral length				-			$\pm 0.5\%$

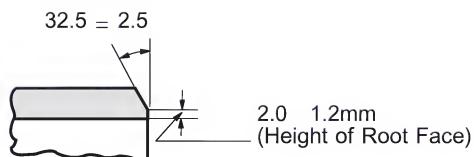
Right Angle For Shaft-Center of Pipe Fittings

(in millimeters)

ITEM	Type of Pipe Fitting	Nominal Diameter						
		$\frac{1}{2}$ -4	5-8	10-12	14-16	18-24	26-30	32-48
Tolerance								
Off Angle (X)	All Pipe Fitting	0.8	1.6	2.4	3.2		4.8	
Off Plane (Y)	All Pipe Fitting	1.6	3.2	4.8	6.4	9.5	12.7	19.1

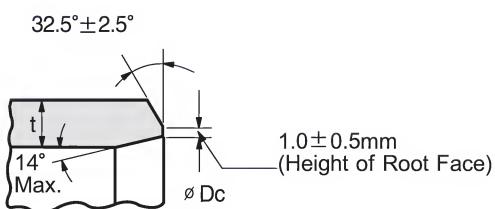


Steel Butt-Welding Pipe Fittings For Ordinary Use

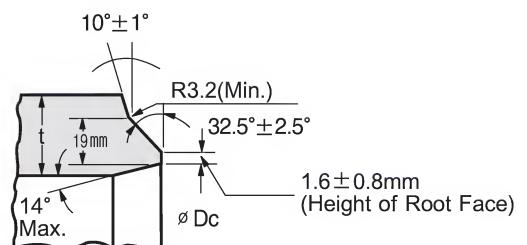


Steel Butt-Welding Pipe Fittings For Special Use

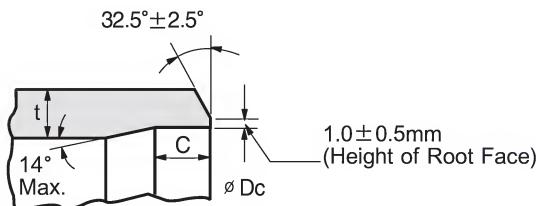
A: In the Case Where t is 22.4mm or Less



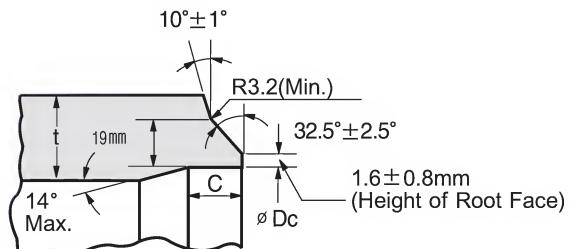
B: In the Case Where t Is Over 22.4mm



C: In the Case Where t is 22.4mm or Less



D: In the Case Where t Is Over 22.4mm



Where t :nominal wall thickness

Dc:diameter of machining bore

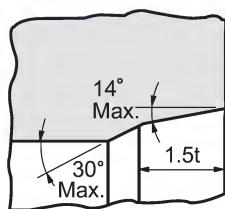
C :length of machining bore

Remarks

1. Dimeter(Dc) and length(C) of machining bore and dimensional tolerances shall be agreed between parties concerned.
2. Relieving of machining bore may be performed by providing an inclination of 14° or less from the end face to the limits of 1.5times the wall thickness, or after cutting to the cylindrical surface to the length of machining bore, providing an inclination of 14° or less to the limits above-indicated, and beyond that portion machining with an inclination of 45° or less.

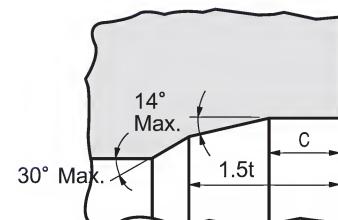


For Types A and B Bevel Shape



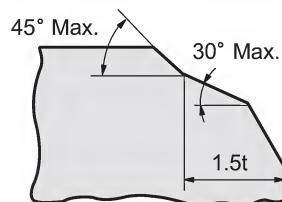
In the figure,
t : nominal wall thickness

For Types C and D Bevel Shape



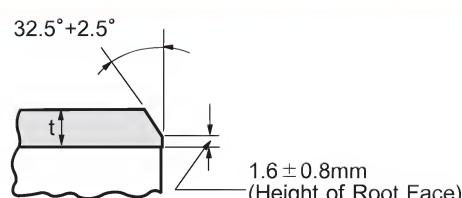
In the figure,
t : nominal wall thickness
c : length of machining bore

Relieving for outside diameter may be performed by providing an inclination of 30° or less from the end face to the limits of 1.5times the wall thickness, and beyond that portion machining with an inclination of 45° or less.

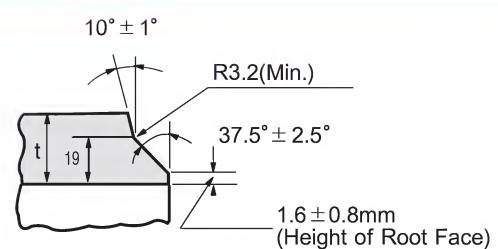


In the figure,
t : nominal wall thickness

Steel Plate Butt-Welding Pipe Fittings



Where. $t \leq 22.4\text{mm}$



Where. $t > 22.4\text{mm}$

Remarks: 1. The shape and dimensions of the special bevel ends are referred to the reference clause stated in JIS B 2312(KS B 1541)

MSS SP-43 Dimensional Tolerance

(in inches)

Nominal Pipe Size	All Fittings		90° Elbows 45° Elbows Tees	Reducers Lap Joint Stub Ends	180° Returns			Caps
	Outside(1) Diameter at Welding End	Wall Thickness	Center-to- End Dimension A,B,C,M	Overall Length F,H	Center-to- Center Dimension O	Back-to- Face Dimension K	Alignment of Ends U	Overall Length E
1/2 - 1 1/2	±0.03	Not less than 87 1/2% of nominal thickness	±0.06	±0.06	±0.25	±0.25	±0.03	±0.12
2-3 1/2	±0.03		±0.06	±0.06	±0.25	±0.25	±0.03	±0.12
4	±0.03		±0.06	±0.06	±0.25	±0.25	±0.03	±0.12
5-8	+0.06 -0.03		±0.06	±0.06	±0.25	±0.25	±0.03	±0.25
10-18	+0.09 -0.03		±0.09	±0.09	±0.38	±0.25	±0.06	±0.25
20-24	+0.12 -0.03		±0.09	±0.09	±0.38	±0.25	±0.06	±0.25

(in inches)

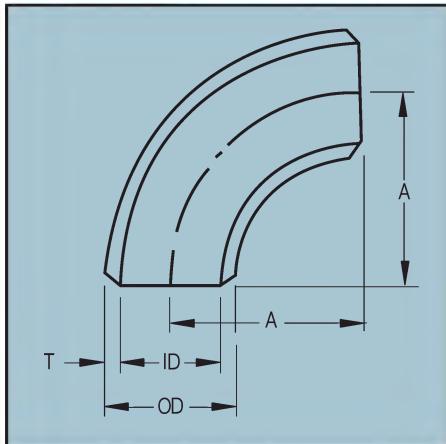
Nominal Pipe Size	All Fittings			Lap Joint (Stub Ends)	
	Outside(1) Diameter at Welding End	Wall Thickness	Fillet(2) Radius of Lap A	Outside Diameter of Lap G	
1/2 - 1 1/2	±0.03	Not less than 87 1/2% of nominal thickness	+0 -0.03	+0 -0.03	
2-3 1/2	±0.03		+0 -0.03	+0 -0.03	
4	±0.03		+0 -0.06	+0 -0.03	
5-8	+0.06 ±0.03		+0 -0.06	+0 -0.03	
10-18	+0.09 ±0.03		+0 -0.06	+0 -0.06	
20-24	+0.12 ±0.03		+0 -0.06	+0 -0.06	

Notes:

- (1) Out of roundness is the vector sum of the plus and minus tolerance.
- (2) Fillet B radius is the maximum.

Approx Weight Estimate Equation

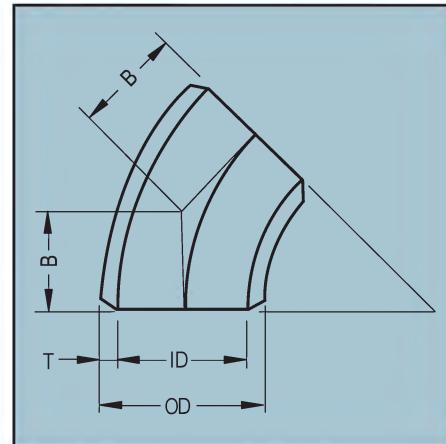
90° Elbow



$$AW = 3.8699 \times A \times T \times (OD - T) \times 10^{-5}$$

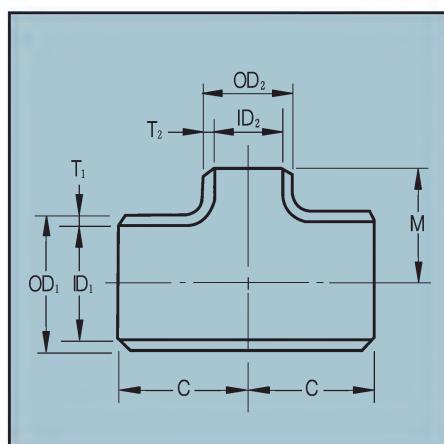
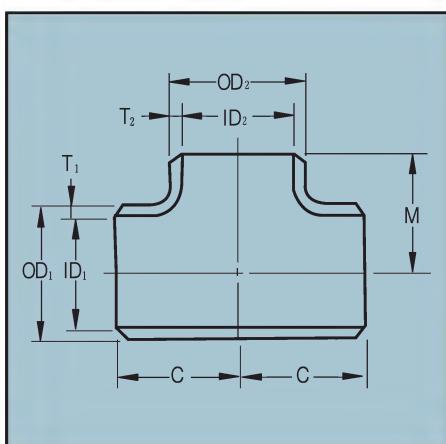
AW: Approx Weight (Unit:kgs)
 T: Wall Thickness (mm)
 OD: Outside Diameter (mm)
 A: Radius (mm)

45° Elbow



$$AW = 1.9350 \times A \times T \times (OD - T) \times 10^{-5}$$

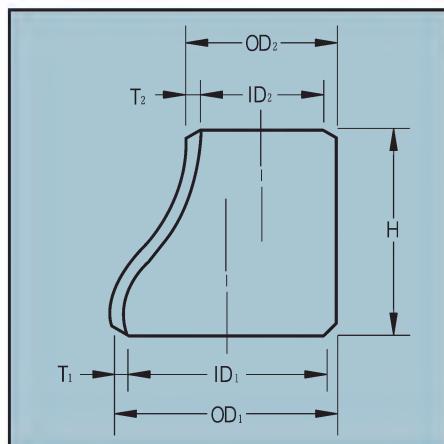
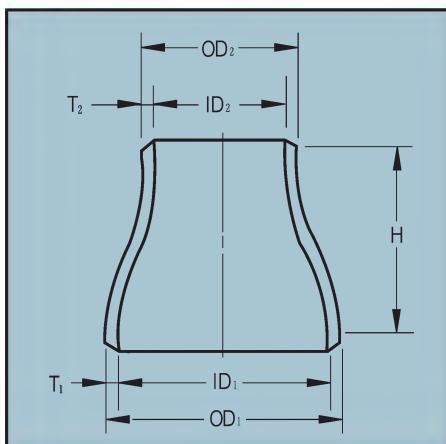
AW: Approx Weight (Unit:kgs)
 T: Wall Thickness (mm)
 OD: Outside Diameter (mm)
 A: Radius (mm)



Tee

$$AW = 2.4649 \{2CT_1(OD_1 - T) + T_2(OD_1 - T_2)(M - \frac{OD_1}{2})\} \times 10^{-5}$$

 AW: Approx Weight (Unit:kgs)
 T₁: Wall Thickness (mm)
 OD₁: Outside Diameter (mm)
 T₂: Wall Thickness (mm)
 OD₂: Outside Diameter (mm)
 C: Center to End Diameter (mm)
 M: Center to End Diameter (mm)



Reducer

$$AW = 2.4649 \times H \times T \times (\frac{OD_1 + OD_2}{2} - T) \times 10^{-5}$$

 AW: Approx Weight (Unit:kgs)
 T: Wall Thickness (mm)
 OD₁: Outside Diameter (mm)
 OD₂: Outside Diameter (mm)
 H: Length (mm)

Butt Welding Fittings Approx Weight List

90° Elbows

LONG

SHORT

(UNIT : Kgs)

Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160	SGP	STD	S40	XS	S80	XXS	S160	Nominal Pipe Size
1/2	0.08	0.08	0.08	0.10	0.10	—	—	—	—	—	—	—	—	—	1/2
3/4	0.10	0.11	0.11	0.14	0.14	—	—	—	—	—	—	—	—	—	3/4
1	0.15	0.16	0.16	0.20	0.20	0.36	0.25	0.10	0.11	0.11	0.14	0.14	—	—	1
1 1/4	0.26	0.26	0.26	0.35	0.35	0.64	0.42	0.17	0.18	0.18	0.23	0.23	—	—	1 1/4
1 1/2	0.35	0.37	0.37	0.50	0.50	0.93	0.65	0.24	0.25	0.25	0.33	0.33	—	—	1 1/2
2	0.64	0.66	0.66	0.90	0.90	1.69	1.33	0.43	0.44	0.44	0.60	0.60	1.13	0.89	2
2 1/2	1.12	1.37	1.37	1.79	1.79	3.43	2.33	0.75	0.91	0.91	1.19	1.19	2.19	1.49	2 1/2
3	1.58	2.04	2.04	2.74	2.74	5.25	3.83	1.05	1.36	1.36	1.83	1.83	3.49	2.55	3
4	2.91	3.84	3.84	5.36	5.36	10.2	8.02	1.94	2.56	2.56	3.58	3.58	6.79	2.35	4
5	4.49	6.48	6.48	9.13	9.13	17.6	14.7	2.99	4.32	4.32	6.09	6.09	11.8	9.79	5
6	7.09	9.94	9.94	15.0	15.0	29.1	24.2	4.73	6.63	6.63	10.0	10.0	19.5	16.2	6
8	14.4	20.1	20.1	30.5	30.5	51.4	53.2	9.61	13.4	13.4	20.3	20.3	34.3	35.5	8
10	25.4	35.4	35.4	47.7	57.0	82.0	103	16.9	23.6	23.6	31.8	38.0	61.0	68.6	10
12	38.1	52.0	57.0	68.7	94.0	130	171	25.4	34.6	38.0	45.8	63.0	87.0	114	12
14	56.7	67.9	79.1	89.9	133	—	236	37.8	45.3	53.0	60.0	89.0	—	158	14
16	74.3	89.0	118	118	195	—	350	49.5	59.1	79.0	78.3	130	—	234	16
18	94.2	113	169	150	275	—	495	62.8	75.3	113	99.9	183	—	330	18
20	116	140	220	186	373	—	676	77.7	93.1	147	124	249	—	451	20
22	141	169	—	225	493	—	886	94.1	113	—	150	329	—	591	22
24	168	202	366	268	636	—	1160	112	135	244	179	424	—	773	24
26	198	237	—	315	—	—	—	132	158	—	210	—	—	—	26
28	230	276	—	367	—	—	—	154	184	—	245	—	—	—	28
30	264	316	—	421	—	—	—	176	211	—	281	—	—	—	30
32	301	361	654	480	—	—	—	201	241	436	320	—	—	—	32
34	340	408	739	543	—	—	—	227	272	493	362	—	—	—	34
36	380	457	904	608	—	—	—	253	304	603	405	—	—	—	36
38	425	510	—	679	—	—	—	283	340	—	453	—	—	—	38
40	471	565	—	753	—	—	—	314	377	—	502	—	—	—	40
42	518	622	—	828	—	—	—	346	416	—	554	—	—	—	42
44	570	684	—	912	—	—	—	380	456	—	608	—	—	—	44
46	623	748	—	997	—	—	—	415	499	—	665	—	—	—	46
48	677	814	—	1085	—	—	—	452	543	—	724	—	—	—	48

180° Elbows

LONG

SHORT

(UNIT : Kgs)

Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160	SGP	STD	S40	XS	S80	XXS	S160	Nominal Pipe Size	
1/2	0.16	0.16	0.16	0.20	0.20	—	—	—	—	—	—	—	—	—	1/2	
3/4	0.21	0.22	0.22	0.28	0.28	—	—	—	—	—	—	—	—	—	3/4	
1	0.30	0.32	0.32	0.40	0.40	0.72	0.50	0.20	0.22	0.22	0.28	0.28	—	—	1	
1 1/4	0.51	0.52	0.52	0.70	0.70	1.28	0.84	0.34	0.36	0.36	0.46	0.46	—	—	1 1/4	
1 1/2	0.70	0.74	0.74	1.00	1.00	1.86	1.30	0.48	0.50	0.50	0.66	0.66	—	—	1 1/2	
2	1.28	1.32	1.32	1.80	1.80	3.38	2.66	0.86	0.88	0.88	1.20	1.20	2.26	1.78	2	
2 1/2	2.24	2.74	2.74	3.58	3.58	6.86	4.66	1.50	1.82	1.82	2.38	2.38	4.38	2.98	2 1/2	
3	3.16	4.08	4.08	5.48	5.48	10.5	7.66	2.10	2.72	2.72	3.66	3.66	6.98	5.10	3	
4	5.83	7.68	7.68	10.7	10.7	20.4	16.1	3.88	5.12	5.12	7.16	7.16	13.6	10.7	4	
5	8.98	13.0	13.0	18.3	18.3	35.2	29.4	5.98	8.64	8.64	12.2	12.2	23.5	19.6	5	
6	14.2	19.9	19.9	30.0	30.0	58.2	48.4	9.46	13.3	13.3	20.2	20.2	39.0	32.4	6	
8	28.8	40.2	40.2	61.0	61.0	103	106	19.2	26.8	26.8	40.6	40.6	68.6	71.0	8	
10	50.8	70.8	70.8	95.4	114	164	206	33.8	47.2	47.2	63.6	76.0	122	138	10	
12	76.2	104	114	137	188	260	342	50.8	69.2	76.0	91.6	126	174	228	12	
14	114	136	158	180	266	—	472	75.6	90.6	106	120	178	—	316	14	
16	149	178	236	236	390	—	700	99.0	118	158	156	260	—	468	16	
18	189	226	338	300	550	—	990	125	150	226	199	366	—	660	18	
20	232	280	440	372	746	—	1352	155	186	294	248	498	—	902	20	
22	282	338	—	450	986	—	1772	188	226	300	658	—	1182	22		
24	336	404	732	536	1272	—	2320	224	270	488	358	848	—	1546	24	

Butt Welding Fittings Approx Weight List

45° Elbows

LONG

SHORT

(UNIT : Kgs)

Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160	SGP	STD	S40	XS	S80	XXS	S160	Nominal Pipe Size
1/2	0.04	0.04	0.04	0.05	0.05	—	—	—	—	—	—	—	—	—	1/2
3/4	0.05	0.06	0.06	0.07	0.07	—	—	—	—	—	—	—	—	—	3/4
1	0.08	0.08	0.08	0.10	0.10	0.18	0.13	0.05	0.06	0.06	0.07	0.07	—	—	1
1 1/4	0.13	0.13	0.13	0.18	0.18	0.32	0.21	0.09	0.09	0.09	0.12	0.12	—	—	1 1/4
1 1/2	0.18	0.19	0.19	0.25	0.25	0.47	0.33	0.12	0.13	0.13	0.17	0.17	—	—	1 1/2
2	0.32	0.33	0.33	0.45	0.45	0.85	0.67	0.22	0.22	0.22	0.30	0.30	0.57	0.45	2
2 1/2	0.60	0.69	0.69	0.90	0.90	1.72	1.17	0.38	0.46	0.46	0.60	0.60	1.10	0.75	2 1/2
3	0.79	1.02	1.02	1.37	1.37	2.63	1.92	0.53	0.68	0.68	0.92	0.92	1.75	1.28	3
4	1.46	1.92	1.92	2.68	2.68	5.09	4.01	0.97	1.28	1.28	1.79	1.79	3.40	2.68	4
5	2.25	3.24	3.24	4.57	4.57	8.80	7.35	1.50	2.16	2.16	3.05	3.05	5.88	4.90	5
6	3.55	4.97	4.97	7.50	7.50	14.5	12.1	2.36	3.32	3.32	5.00	5.00	9.75	8.10	6
8	7.20	10.1	10.1	15.3	15.3	25.7	26.6	4.80	6.71	6.71	10.2	10.2	17.2	17.8	8
10	12.7	17.7	17.7	23.9	28.5	41.0	51.5	8.46	11.8	11.8	15.9	19.0	30.5	34.3	10
12	19.0	26.0	28.5	34.4	47.0	65.0	85.5	12.7	17.3	19.0	22.9	31.5	43.5	57.0	12
14	28.4	34.0	40.1	45.0	66.5	—	118	18.0	22.6	26.5	30.0	44.5	—	79.0	14
16	37.2	44.5	59.0	59.0	97.5	—	175	24.0	29.5	39.2	39.2	65.0	—	117	16
18	47.1	56.5	84.5	75.0	138	—	247	31.0	37.6	56.5	50.0	91.5	—	165	18
20	58.3	70.0	110	93.0	187	—	338	38.0	46.6	73.5	62.0	124	—	225	20
22	70.5	84.5	—	113	257	—	443	47.0	56.5	—	75.0	164	—	295	22
24	84.1	101	183	134	318	—	580	56.0	67.3	122	89.5	212	—	386	24
26	99.0	119	—	158	—	—	—	66.0	79.1	—	105	—	—	—	26
28	115	138	—	184	—	—	—	77.0	92.0	—	122	—	—	—	28
30	132	158	—	211	—	—	—	87.0	105	—	140	—	—	—	30
32	150	180	327	240	—	—	—	101	120	218	160	—	—	—	32
34	170	204	369	272	—	—	—	114	136	246	181	—	—	—	34
36	190	228	452	304	—	—	—	127	152	301	202	—	—	—	36
38	212	255	—	339	—	—	—	142	170	—	226	—	—	—	38
40	235	282	—	376	—	—	—	157	189	—	251	—	—	—	40
42	259	311	—	414	—	—	—	173	208	—	277	—	—	—	42
44	285	342	—	456	—	—	—	190	228	—	304	—	—	—	44
46	312	374	—	498	—	—	—	208	250	—	332	—	—	—	46
48	339	407	—	542	—	—	—	226	272	—	362	—	—	—	48

CAPS

(UNIT : Kgs)

Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160	Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160
1/2	0.03	0.04	0.04	0.05	0.05	—	—	18	21.2	25.5	41.5	34.1	69.0	—	131
3/4	0.04	0.05	0.05	0.07	0.07	—	—	20	26.4	31.8	54.1	42.5	93.7	—	179
1	0.08	0.11	0.11	0.15	0.15	—	—	22	31.5	38.8	—	51.7	116	—	219
1 1/4	0.11	0.14	0.14	0.20	0.20	—	—	24	36.6	45.1	90.1	60.1	160	—	307
1 1/2	0.15	0.17	0.17	0.24	0.24	0.50	0.35	26	41.0	50.5	—	67.3	—	—	—
2	0.23	0.24	0.24	0.33	0.33	0.68	0.54	28	45.5	56.2	—	74.9	—	—	—
2 1/2	0.34	0.42	0.42	0.57	0.57	1.13	0.77	30	50.3	62.1	—	82.8	—	—	—
3	0.51	0.67	0.67	0.92	0.92	1.92	1.40	32	55.4	68.4	126	91.2	—	—	—
4	0.88	1.17	1.17	1.68	1.68	3.51	2.76	34	60.8	75.0	138	100	—	—	—
5	1.29	1.90	1.90	2.73	2.73	5.82	4.85	36	66.4	81.9	164	109	—	—	—
6	1.99	2.83	2.83	4.38	4.38	9.38	7.81	38	76.8	94.7	—	126	—	—	—
8	3.61	5.11	5.11	7.91	7.91	14.7	1.52	40	83.0	102	—	137	—	—	—
10	6.33	8.92	8.92	12.2	16.4	25.7	28.9	42	90.0	110	—	147	—	—	—
12	9.43	13.1	13.1	17.4	26.4	36.4	47.7	44	103	126	—	167	—	—	—
14	13.2	15.9	18.6	21.2	34.9	—	61.2	46	109	134	—	179	—	—	—
16	16.6	20.0	26.7	26.7	49.0	—	130	48	116	143	—	191	—	—	—

Butt Welding Fittings Approx Weight List

TEES

(UNIT : Kgs)

Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160	Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160
$\frac{1}{2} \times \frac{1}{2}$	0.09	0.09	0.09	0.11	0.11	—	—	20×20	86.6	104	204	138	353	—	631
$\frac{3}{4} \times \frac{3}{4}$	0.13	0.13	0.13	0.17	0.17	—	—	18	84.2	101	188	134	306	—	528
$\frac{1}{2} \times \frac{1}{2} \times 1$	0.12	0.12	0.12	0.16	0.16	—	—	16	82.1	98.4	181	131	294	—	508
$1 \times 1 \times 1$	0.24	0.25	0.25	0.32	0.32	—	—	14	81.1	97.2	178	129	289	—	491
$\frac{3}{4} \times \frac{1}{2}$	0.23	0.24	0.24	0.30	0.30	—	—	22 \times 22	106	126	—	167	453	—	835
$\frac{1}{2} \times \frac{1}{2} \times 1\frac{1}{4}$	0.22	0.23	0.23	0.29	0.29	—	—	20	103	123	—	163	386	—	740
$1\frac{1}{4} \times 1\frac{1}{4}$	0.42	0.43	0.43	0.56	0.56	—	—	18	101	120	—	159	373	—	696
$1 \times 1 \times 1\frac{1}{4}$	0.39	0.40	0.40	0.53	0.53	—	—	16	98.9	117	—	156	354	—	656
$1\frac{1}{2} \times 1\frac{1}{2}$	0.58	0.61	0.61	0.81	0.81	—	—	24 \times 24	116	139	299	185	548	—	1012
$1\frac{1}{4} \times 1\frac{1}{4}$	0.56	0.59	0.59	0.78	0.78	—	—	22	115	138	—	183	503	—	922
$1 \times 1 \times 1\frac{1}{4}$	0.53	0.56	0.56	0.74	0.74	—	—	20	114	136	268	181	467	—	843
$\frac{3}{4} \times 1\frac{1}{4}$	0.51	0.53	0.53	0.70	0.70	—	—	18	111	133	249	177	418	—	769
$2 \times 2 \times 2$	0.86	0.88	0.88	1.20	1.20	—	—	26 \times 26	147	176	—	234	—	—	—
$1\frac{1}{2} \times 1\frac{1}{2}$	0.80	0.82	0.82	1.11	1.11	—	—	24	144	172	—	229	—	—	—
$1\frac{1}{4} \times 1\frac{1}{4}$	0.77	0.79	0.79	1.09	1.07	—	—	22	141	169	—	225	—	—	—
$1 \times 1 \times 1\frac{1}{4}$	0.73	0.75	0.75	1.01	1.01	—	—	20	138	166	—	211	—	—	—
$2\frac{1}{2} \times 2\frac{1}{2}$	1.42	1.74	1.74	2.28	2.28	4.20	3.63	28 \times 28	161	192	—	256	—	—	—
$2 \times 2 \times 2\frac{1}{2}$	2.31	1.56	1.56	2.06	2.06	3.56	3.56	26	157	189	—	251	—	—	—
$1\frac{1}{2} \times 1\frac{1}{2} \times 2\frac{1}{2}$	1.25	1.51	1.51	1.98	1.98	3.40	3.40	24	153	184	—	244	—	—	—
$1\frac{1}{4} \times 1\frac{1}{4} \times 2\frac{1}{2}$	1.22	1.48	1.48	1.94	1.94	—	—	22	151	182	—	242	—	—	—
$3 \times 3 \times 3$	1.87	2.41	2.41	3.25	3.25	7.00	5.87	30 \times 30	190	228	—	304	—	—	—
$2\frac{1}{2} \times 2\frac{1}{2} \times 3$	1.79	2.29	2.29	3.07	3.07	9.49	5.45	28	188	226	—	301	—	—	—
$2 \times 2 \times 3\frac{1}{2}$	1.68	2.12	2.12	2.85	2.85	5.17	5.17	26	185	222	—	296	—	—	—
$1\frac{1}{2} \times 1\frac{1}{2} \times 3\frac{1}{2}$	1.62	2.06	2.06	2.77	2.77	—	—	24	182	218	—	291	—	—	—
$4 \times 4 \times 4$	3.13	4.12	4.12	5.77	5.77	12.8	9.76	32 \times 32	208	259	—	331	—	—	—
$3 \times 3 \times 4$	2.92	3.83	3.83	5.33	5.33	11.4	9.05	30	203	244	—	325	—	—	—
$2\frac{1}{2} \times 2\frac{1}{2} \times 4$	2.84	3.71	3.71	5.15	5.15	11.3	7.74	28	200	240	—	319	—	—	—
$2 \times 2 \times 4\frac{1}{2}$	2.72	3.53	3.53	4.94	4.94	9.01	7.30	26	199	138	—	317	—	—	—
$5 \times 5 \times 5$	4.53	6.54	6.54	9.20	9.20	20.2	22.2	34 \times 34	246	295	—	393	—	—	—
$4 \times 4 \times 5$	4.30	6.13	6.13	8.63	8.63	19.0	15.3	32	243	292	—	389	—	—	—
$3 \times 3 \times 5$	4.08	5.83	5.83	8.19	8.19	17.9	14.7	30	238	290	—	380	—	—	—
$2\frac{1}{2} \times 2\frac{1}{2} \times 5$	4.00	5.71	5.71	8.01	8.01	—	14.3	28	236	288	—	377	—	—	—
$6 \times 6 \times 6$	6.84	9.58	9.58	14.5	14.5	28.4	31.4	36 \times 36	276	331	—	441	—	—	—
$5 \times 5 \times 6$	6.45	9.08	9.08	13.6	13.5	27.1	24.3	34	271	329	—	434	—	—	—
$4 \times 4 \times 6$	6.23	8.67	8.67	13.0	13.0	25.8	23.2	31	269	326	—	431	—	—	—
$3 \times 3 \times 6$	6.01	8.38	8.38	12.6	12.6	23.7	22.5	30	264	323	—	422	—	—	—
$8 \times 8 \times 8$	12.8	17.9	17.9	27.1	27.1	51.4	50.7	38 \times 38	308	370	—	493	—	—	—
$6 \times 6 \times 8$	11.9	16.6	16.6	25.2	25.2	48.1	47.6	36	306	367	—	489	—	—	—
$5 \times 5 \times 8$	11.5	16.1	16.1	24.3	24.3	46.8	46.1	34	302	362	—	481	—	—	—
$4 \times 4 \times 8$	11.3	15.7	15.7	23.7	23.7	45.6	45.0	32	298	357	—	476	—	—	—
$10 \times 10 \times 10$	21.8	30.4	30.4	41.0	60.8	96.7	96.7	40 \times 40	342	411	—	547	—	—	—
$8 \times 8 \times 10$	20.4	28.5	28.5	38.9	51.9	89.7	89.7	38	340	408	—	543	—	—	—
$6 \times 6 \times 10$	19.5	27.2	27.2	37.0	50.0	80.9	80.9	36	335	402	—	536	—	—	—
$5 \times 5 \times 10$	19.2	26.8	26.8	36.2	49.2	79.6	79.6	34	331	397	—	529	—	—	—
$12 \times 12 \times 12$	32.0	43.6	47.2	57.7	95.8	155	155	42 \times 42	352	422	—	562	—	—	—
$10 \times 10 \times 12$	30.4	41.6	41.6	55.2	90.5	146	146	40	350	420	—	559	—	—	—
$8 \times 8 \times 12$	29.0	39.7	39.7	53.1	77.1	139	139	38	348	418	—	557	—	—	—
$6 \times 6 \times 12$	28.1	38.4	38.4	51.2	75.2	136	136	36	346	416	—	554	—	—	—
$14 \times 14 \times 14$	44.7	53.5	61.7	70.9	129	—	201	44 \times 44	396	475	—	633	—	—	—
$12 \times 12 \times 14$	42.7	51.9	60.1	68.8	123	—	192	42	394	473	—	630	—	—	—
$10 \times 10 \times 14$	41.2	49.9	49.9	66.3	108	—	184	40	389	467	—	623	—	—	—
$8 \times 8 \times 14$	40.0	48.2	48.2	64.5	103	—	178	38	385	462	—	616	—	—	—
$16 \times 16 \times 16$	55.2	66.1	87.7	87.7	173	—	334	46 \times 46	434	521	—	695	—	—	—
$14 \times 14 \times 16$	54.2	64.9	86.1	86.1	158	—	280	44	432	519	—	691	—	—	—
$12 \times 12 \times 16$	52.7	63.1	83.6	83.6	152	—	263	42	427	513	—	683	—	—	—
$10 \times 10 \times 16$	51.2	61.3	81.2	81.2	147	—	255	40	423	507	—	676	—	—	—
$18 \times 18 \times 18$	70.0	83.9	156	111	253	—	470	48 \times 48	474	569	—	759	—	—	—
$16 \times 16 \times 18$	67.9	81.4	135	108	228	—	416	46	472	566	—	755	—	—	—
$14 \times 14 \times 18$	66.9	20.2	132	106	223	—	375	44	470	564	—	751	—	—	—
$12 \times 12 \times 18$	65.4	78.3	128	104	217	—	368	42	462	555	—	739	—	—	—

Butt Welding Fittings Approx Weight List

REDUCERS

(UNIT : Kgs)

Nominal Pipe Size	SGP	STD	S40	XS	S80	XXS	S160	Nominal Pipe Size	SGP	STD	S40	XS	S80	
$\frac{3}{4} \times \frac{1}{2}$	0.06	0.06	0.06	0.08	0.08	—	—	22×20	52.1	62.4	—	82.9	181	
$1 \times \frac{3}{4}$	0.11	0.12	0.12	0.15	0.15	0.25	0.19	18	49.5	59.4	—	78.9	172	
$\frac{1}{2}$	0.10	0.11	0.11	0.14	0.14	0.22	0.17	16	47.0	56.4	—	74.8	164	
$1\frac{1}{4} \times 1$	0.16	0.16	0.16	0.21	0.21	0.35	0.25	24×22	57.1	68.4	—	91.0	215	
$\frac{3}{4}$	0.15	0.15	0.15	0.19	0.19	0.31	0.23	20	54.8	65.7	119	87.3	206	
$\frac{1}{2}$	0.13	0.14	0.14	0.18	0.18	—	—	18	52.6	63.0	114	83.8	197	
$1\frac{1}{2} \times 1\frac{1}{4}$	0.24	0.25	0.25	0.33	0.33	0.57	0.43	26×24	74.5	89.4	—	119	—	
1	0.21	0.22	0.22	0.30	0.30	0.50	0.38	22	71.5	85.8	—	114	—	
$\frac{3}{4}$	0.20	0.21	0.21	0.27	0.27	0.45	0.35	20	68.5	82.1	—	109	—	
$2 \times 1\frac{1}{2}$	0.37	0.38	0.38	0.51	0.51	0.91	0.75	28×26	80.6	96.6	—	129	—	
$\frac{1}{4}$	0.35	0.36	0.36	0.48	0.48	0.85	0.70	24	77.5	93.0	—	124	—	
1	0.31	0.33	0.33	0.44	0.44	0.77	0.64	22	74.5	89.4	—	119	—	
$2\frac{1}{2} \times 2$	0.60	0.73	0.73	0.95	0.95	1.68	1.20	30×28	86.6	104	—	138	—	
$\frac{1}{2}$	0.55	0.67	0.67	0.87	0.87	1.51	1.08	26	83.6	100	—	133	—	
$\frac{1}{4}$	0.52	0.64	0.64	0.83	0.83	1.42	1.02	24	80.6	96.6	—	129	—	
3	$\times 2\frac{1}{2}$	0.73	0.94	0.94	1.25	1.25	2.25	1.71	32×30	92.6	111	—	148	—
2		0.66	0.85	0.85	1.13	1.13	2.01	1.57	28	89.6	108	—	143	—
$\frac{1}{2}$		0.62	0.79	0.79	1.04	1.04	1.83	1.44	26	86.6	104	—	138	—
4	$\times 3$	1.10	1.45	1.45	2.01	2.02	3.65	3.00	34×32	98.7	118	—	158	—
$2\frac{1}{2}$		1.04	1.37	1.37	1.90	1.90	3.41	2.76	30	95.6	115	—	153	—
2		0.97	1.27	1.27	1.76	1.76	3.11	2.58	28	92.6	111	—	148	—
5	$\times 4$	1.74	2.50	2.50	3.52	3.52	6.47	5.59	36×34	105	126	—	167	—
3		1.58	2.27	2.27	3.18	3.18	5.78	5.30	32	102	122	—	163	—
$2\frac{1}{2}$		1.50	2.16	2.16	3.02	3.02	5.46	4.70	30	98.7	118	—	158	—
6	$\times 5$	2.55	3.57	3.57	5.38	5.38	9.89	8.63	38×36	112	133	—	177	—
4		2.36	3.30	3.30	4.96	4.96	8.98	7.88	34	108	129	—	172	—
3		2.18	3.04	3.04	4.56	4.56	8.21	7.21	32	105	126	—	167	—
8	$\times 6$	4.17	5.71	5.71	8.63	8.63	14.3	15.0	40×38	117	140	—	187	—
5		3.87	5.40	5.40	8.14	8.14	13.4	14.0	36	114	137	—	182	—
4		3.67	5.10	5.10	7.68	7.68	12.6	13.1	34	111	133	—	177	—
10	$\times 8$	6.87	9.58	9.58	12.9	15.4	24.3	27.5	42×40	123	147	—	196	—
6		6.32	8.78	8.78	11.8	14.2	22.1	25.1	38	120	144	—	192	—
5		6.06	8.42	8.42	11.3	13.5	21.1	23.9	36	117	140	—	187	—
12	$\times 10$	9.97	13.6	14.7	18.0	24.8	34.3	44.6	44×42	129	155	—	206	—
8		9.29	12.7	13.7	16.7	22.7	31.7	41.0	40	126	151	—	201	—
6		8.69	11.8	12.8	15.6	21.4	29.4	38.0	38	123	147	—	196	—
14	$\times 12$	21.2	25.4	29.5	33.6	49.8	—	88.5	46×44	157	189	—	252	—
10		19.7	23.6	27.4	31.2	46.1	—	81.6	42	154	185	—	246	—
8		18.3	21.8	25.4	28.9	42.2	—	74.7	40	150	180	—	241	—
16	$\times 14$	25.9	31.0	41.1	41.1	67.7	—	121	48×46	164	197	—	263	—
12		24.1	29.6	39.2	39.2	65.0	—	116	44	161	193	—	257	—
10		22.4	27.8	36.8	36.8	60.8	—	108	42	157	189	—	252	—
18	$\times 16$	31.5	37.8	56.2	50.1	91.4	—	165						
14		29.8	35.7	53.0	47.4	86.4	—	155						
12		27.7	33.2	51.0	44.0	83.0	—	149						
20	$\times 18$	47.0	56.4	88.4	74.9	150	—	—						
16		44.7	53.5	83.9	71.1	142	—	—						
14		42.4	50.8	79.6	67.4	136	—	—						

Threaded Fittings Approx Weight List

(UNIT : Kgs)

Rating	Nominal Pipe Size	90° Elbow	45° Elbow	Tee	Cross	Union
2000 CLASS	$\frac{1}{8}$	0.11	0.06	0.11	0.23	—
	$\frac{1}{4}$	0.11	0.06	0.11	0.23	0.15
	$\frac{3}{8}$	0.14	0.11	0.14	0.23	0.22
	$\frac{1}{2}$	0.25	0.20	0.25	0.40	0.31
	$\frac{3}{4}$	0.31	0.29	0.43	0.51	0.54
	1	0.51	0.43	0.65	0.77	0.76
	$1\frac{1}{4}$	0.77	0.63	0.91	1.13	1.15
	$1\frac{1}{2}$	1.02	0.74	1.25	1.45	1.51
	2	1.59	1.22	2.10	2.38	2.40
	$2\frac{1}{2}$	2.95	3.35	3.94	7.46	—
	3	4.76	5.13	5.98	8.85	—
	4	10.3	8.65	12.4	14.5	—

(UNIT : Kgs)

Rating	Nominal Pipe Size	90° Elbow	45° Elbow	Tee	Cross	Union
3000 CLASS	$\frac{1}{8}$	0.11	0.11	0.11	0.20	0.10
	$\frac{1}{4}$	0.17	0.11	0.13	0.17	0.19
	$\frac{3}{8}$	0.29	0.23	0.37	0.45	0.25
	$\frac{1}{2}$	0.59	0.34	0.54	0.68	0.43
	$\frac{3}{4}$	0.63	0.54	0.85	1.13	0.62
	1	1.02	0.85	1.13	1.61	1.03
	$1\frac{1}{4}$	1.25	0.97	1.42	1.87	1.15
	$1\frac{1}{2}$	1.59	1.36	2.27	2.95	1.54
	2	2.47	1.93	3.06	3.69	3.05
	$2\frac{1}{2}$	4.85	3.52	5.96	7.60	5.14
	3	6.55	4.76	9.24	8.96	7.12
	4	13.8	8.68	17.9	14.8	12.40

(UNIT : Kgs)

Rating	Nominal Pipe Size	Coupling	Half Coupling	Square Head plug	Hexagon Head Plug	Hexagon Head Bushing	Flush Bushing
3000 CLASS Round Head and Square Head Plugs	$\frac{1}{8}$	0.06	0.03	0.01	0.03	—	—
	$\frac{1}{4}$	0.06	0.03	0.01	0.03	0.03	0.03
	$\frac{3}{8}$	0.11	0.09	0.03	0.06	0.03	0.03
	$\frac{1}{2}$	0.11	0.09	0.06	0.09	0.03	0.03
	$\frac{3}{4}$	0.20	0.11	0.09	0.14	0.09	0.06
	1	0.29	0.14	0.14	0.23	0.09	0.06
6000 CLASS Hexagon Head Plugs, Couplings, and Bushings	$1\frac{1}{4}$	0.71	0.34	0.25	0.51	0.17	0.06
	$1\frac{1}{2}$	0.99	0.51	0.40	0.63	0.31	0.09
	2	1.42	0.71	0.68	1.02	0.74	0.17
	$2\frac{1}{2}$	1.81	0.91	1.02	1.76	1.08	0.29
	3	3.06	1.53	1.31	2.67	1.59	0.45
	4	7.60	3.80	3.26	5.90	3.77	0.91

Socket Weld Fittings Approx Weight List

(UNIT : Kgs)							
Rating	Nominal Pipe Size	90° Elbow	45° Elbow	TEE	Coupling	Half Coupling	CAP
3000 CLASS	1/4	0.12	—	0.10	0.06	0.06	0.04
	3/8	0.11	0.18	0.16	0.06	0.08	0.05
	1/2	0.20	0.17	0.28	0.11	0.14	0.07
	3/4	0.28	0.23	0.37	0.17	0.20	0.13
	1	0.46	0.35	0.57	0.27	0.34	0.21
	1 1/4	0.65	0.65	0.87	0.35	0.48	0.37
	1 1/2	0.96	0.80	1.28	0.43	0.51	0.60
	2	1.50	1.20	1.80	0.72	1.00	0.99
	2 1/2	2.25	1.85	2.85	1.13	1.55	1.50
	3	4.00	—	5.50	1.50	2.13	2.30
	4	—	—	—	2.50	3.65	4.00

(UNIT : Kgs)							
Rating	Nominal Pipe Size	90° Elbow	45° Elbow	TEE	Coupling	Half Coupling	CAP
6000 CLASS	1/4	0.14	—	0.19	0.06	0.07	—
	3/8	0.12	0.19	0.17	0.07	0.08	—
	1/2	0.23	0.18	0.31	0.14	0.30	0.22
	3/4	0.60	0.50	0.86	0.25	0.43	0.35
	1	1.05	0.88	1.45	0.36	0.69	0.55
	1 1/4	1.40	0.69	1.03	0.46	0.96	0.89
	1 1/2	2.40	1.85	3.04	0.58	1.20	1.15
	2	3.65	2.93	4.44	1.20	2.05	2.05
	2 1/2	6.55	—	9.40	1.60	3.25	3.75
	3	8.60	—	13.2	2.18	4.33	5.10
	4	—	—	—	3.95	6.45	8.20

Pipe Dimension and Weight List

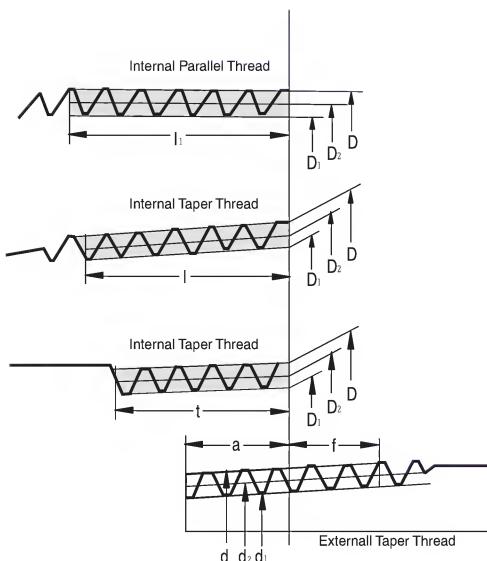
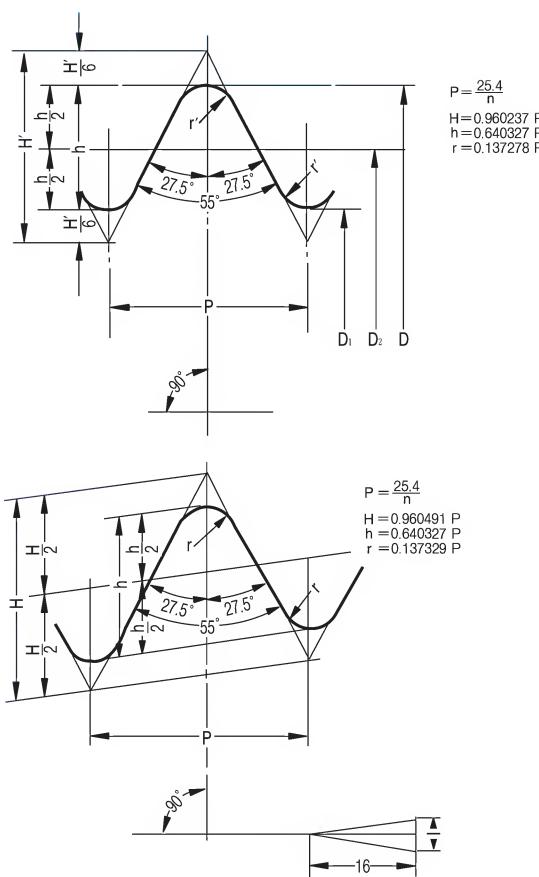
Carbon Steel Pipe

Nom.Size		O.D	Nominal Wall Thickness													
			Sch 40		Sch 60		Sch 80		Sch 100		Sch 120		Sch 140		Sch 160	
A	B	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	
6	1/8	10.5	1.7	0.369	—	—	2.4	0.479	—	—	—	—	—	—	—	
8	1/4	13.8	2.2	0.629	—	—	3.0	0.799	—	—	—	—	—	—	—	
10	3/8	17.3	2.3	0.851	—	—	3.2	1.11	—	—	—	—	—	—	—	
15	1/2	21.7	2.8	1.31	—	—	3.7	1.64	—	—	—	—	—	4.7	1.97	
20	3/4	27.2	2.9	1.74	—	—	3.9	2.24	—	—	—	—	—	3.5	2.94	
25	1	34.0	3.4	2.57	—	—	4.5	3.27	—	—	—	—	—	6.4	4.36	
32	1 1/4	42.7	3.6	3.47	—	—	4.9	4.57	—	—	—	—	—	6.4	5.73	
40	1 1/2	48.6	3.7	4.10	—	—	5.1	5.47	—	—	—	—	—	7.1	7.27	
50	2	60.5	3.9	5.44	—	—	5.5	7.46	—	—	—	—	—	8.7	11.1	
65	2 1/2	76.3	5.2	9.12	—	—	7.0	12.0	—	—	—	—	—	9.5	15.6	
80	3	89.1	5.5	11.3	—	—	7.6	15.3	—	—	—	—	—	11.1	21.4	
90	3 1/2	101.6	5.7	13.5	—	—	8.1	18.7	—	—	—	—	—	12.7	27.8	
100	4	114.3	6.0	16.0	—	—	8.6	22.4	—	—	11.1	28.2	—	13.5	33.6	
125	5	139.8	6.6	21.7	—	—	9.5	30.5	—	—	12.7	39.8	—	15.9	48.6	
150	6	165.2	7.1	27.7	—	—	11.0	41.8	—	—	14.3	53.2	—	18.2	66.0	
200	8	216.3	8.2	42.1	10.3	52.3	12.7	63.8	15.1	74.9	18.2	88.9	20.6	99.4	23.0	110
250	10	267.4	9.3	59.2	12.7	79.8	15.1	93.9	18.2	112	21.4	130	25.4	152	28.6	168
300	12	318.5	10.3	78.3	14.3	107	17.4	129	21.4	157	25.4	184	28.6	204	33.3	234
350	14	355.6	11.1	94.3	15.1	127	19.0	158	23.8	195	27.8	225	31.8	254	35.7	282
400	16	406.4	12.7	123	16.7	160	21.4	203	26.2	246	30.9	286	36.5	333	40.5	365
450	18	457.2	14.3	156	19.0	205	23.8	254	29.4	310	34.9	363	39.7	409	45.2	459
500	20	508.0	15.1	184	20.6	248	26.2	311	32.5	381	38.1	441	44.4	508	50.0	565
550	22	558.8	15.9	213	22.2	294	28.6	374	34.9	451	41.3	527	47.6	600	54.0	672
600	24	609.6	17.5	256	24.6	355	31.0	442	38.9	547	46.0	639	52.4	720	59.5	807
650	26	660.4	18.9	299	26.4	413	34.0	525	41.6	635	49.1	740	56.6	843	64.2	944

Stainless Steel Pipe-

Nom.Size		O.D	Nominal Wall Thickness													
			Sch 5s		Sch 10s		Sch 20s		Sch 40		Sch 80		Sch 120		Sch 160	
A	B	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	T	Weight kg/m	
6	1/8	10.5	1.0	0.234	1.2	0.275	1.5	0.333	1.7	0.369	2.4	0.479	—	—	—	—
8	1/4	13.8	1.2	0.373	1.65	0.494	2.0	0.582	2.2	0.629	3.0	0.799	—	—	—	—
10	3/8	17.3	1.2	0.476	1.65	0.637	2.0	0.755	2.3	0.851	3.2	1.11	—	—	—	—
15	1/2	21.7	1.65	0.816	2.1	1.02	2.5	1.18	2.8	1.31	3.7	1.64	—	—	4.7	1.97
20	3/4	27.2	1.65	1.04	2.1	1.30	2.5	1.52	2.9	1.74	3.9	2.24	—	—	5.5	2.94
25	1	34.0	1.65	1.32	2.8	2.15	3.0	2.29	3.4	2.57	4.5	3.27	—	—	6.4	4.36
32	1 1/4	42.7	1.65	1.67	2.8	2.76	3.0	2.94	3.6	3.47	4.9	4.57	—	—	6.4	5.73
40	1 1/2	48.6	1.65	1.91	2.8	3.16	3.0	3.37	3.7	4.10	5.1	5.47	—	—	7.1	7.29
50	2	60.5	1.65	2.39	2.8	3.98	3.5	4.92	3.9	5.44	5.5	7.46	—	—	8.7	11.1
65	2 1/2	76.3	2.1	3.84	3.0	5.42	3.5	6.28	5.2	9.12	7.0	12.0	—	—	9.5	15.6
80	3	89.1	2.1	4.51	3.0	6.37	4.0	8.39	5.5	11.3	7.6	15.3	—	—	11.1	21.4
90	3 1/2	101.6	2.1	5.15	3.0	7.29	4.0	9.63	5.7	13.5	8.1	18.7	—	—	12.7	27.8
100	4	114.3	2.1	5.81	3.0	8.23	4.0	10.9	6.0	16.0	8.6	22.4	11.1	28.2	13.5	33.6
125	5	139.8	2.8	9.46	3.4	11.4	5.0	16.6	6.6	21.7	9.5	30.5	12.7	39.8	15.9	48.6
150	6	165.2	2.8	11.2	3.4	13.6	5.0	19.8	7.1	27.7	11.0	41.8	14.3	53.2	18.2	66.0
200	8	216.3	2.8	14.7	4.0	20.9	6.5	33.6	8.2	42.1	12.7	63.8	18.2	88.9	23.0	110
250	10	267.4	3.4	23.1	4.0	26.0	6.5	41.8	9.3	59.2	15.1	93.9	21.4	130	28.6	168
300	12	318.5	4.0	31.0	4.5	34.8	6.5	50.0	10.3	78.3	17.4	129	25.4	184	33.3	234

Taper Pipe Threads

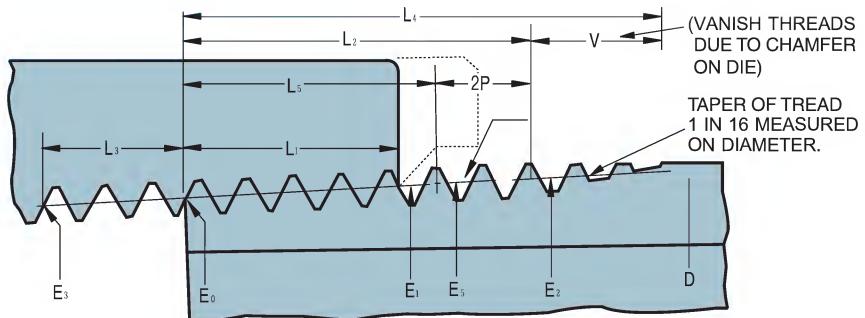


JIS B0203

(in millimeters)

Nominal Size	Screw Thread				Basic Diameter			Position of Basic Diameter			Tolerances on Basic Diameters of Internal Parallel Thread	Effective Thread Length (Min.)			Nominal Pipe Size (For Reference)									
	Number of Threads per Inch	Pitch	Height of Thread	Rounding	External Thread			External Thread		The End of Pipe		External Thread		Internal Thread										
					Major Diameter d	Pitch Diameter d_2	Minor Diameter d_1	From the End of Pipe				Fitting Allowance	Internal Thread											
					Internal Thread			Major Diameter	Pitch Diameter	Minor Diameter		Tolerance Axially	When there is an Incomplete thread or More											
	n	p	h	r	D	D_2	D_1	a	$\pm b$	$\pm c$			Internal Taper Thread	Internal Parallel Thread	Internal Taper and Parallel Thread	Outer Diameter	Wall thickness							
PT 1/2	14	1.8143	1.162	0.25	20.955	19.793	18.631	8.16	1.81	2.27	0.142	5.0	12.7	15.0	9.1	21.7	2.8							
PT 3/4	14	1.8143	1.162	0.25	26.441	25.279	24.117	9.53	1.81	2.27	0.142	5.6	14.1	16.3	10.2	27.2	2.8							
PT 1	11	2.3091	1.479	0.32	33.249	31.770	30.291	10.39	2.31	2.89	0.180	6.4	16.2	19.0	11.5	34.0	3.2							
PT 1 1/4	11	2.3091	1.479	0.32	41.910	40.431	38.952	12.70	2.31	2.89	0.180	6.4	18.5	21.4	13.4	42.7	3.5							
PT 1 1/2	11	2.3091	1.479	0.32	47.803	46.324	44.845	12.70	2.31	2.89	0.180	6.4	18.5	21.4	13.4	48.6	3.5							
PT 2	11	2.3091	1.479	0.32	59.614	58.135	56.656	15.88	2.31	2.89	0.180	7.5	22.8	25.7	16.9	60.5	3.8							
PT 2 1/2	11	2.3091	1.479	0.32	75.184	73.705	72.226	17.46	3.56	3.46	0.217	9.22	26.7	30.2	18.6	76.3	4.2							
PT 3	11	2.3091	1.479	0.32	87.884	86.405	84.926	20.64	3.46	3.46	0.217	9.22	29.9	33.3	21.1	89.1	4.2							
PT 3 1/2	11	2.3091	1.479	0.32	100.330	98.851	97.372	22.23	3.46	3.46	0.217	9.3	31.5	34.9	22.4	101.6	4.2							
PT 4	11	2.3091	1.479	0.32	113.030	111.551	110.072	25.40	3.46	3.46	0.217	10.4	35.9	39.3	25.9	114.3	4.5							
PT 5	11	2.3091	1.479	0.32	138.430	136.952	135.472	25.58	3.46	3.46	0.217	11.4	40.1	43.6	29.3	139.8	4.5							
PT 6	11	2.3091	1.479	0.32	1163.830	162.351	160.872	25.58	3.46	3.46	0.217	11.5	40.1	43.6	29.3	165.2	5.0							

American Pipe Threads



For all dimensions see corresponding reference letters in table.

Angle between sides of thread is 60 degrees. Taper of thread, on diameter, is $\frac{1}{16}$ inch per foot. Angle of taper with centerline is $1^\circ 47'$.

The basic maximum thread height, h , of the truncated thread is $0.8 \times \text{pitch of thread}$. The crest and root are truncated a minimum of $0.033 \times \text{pitch}$ for all pitches. For maximum depth of truncation see Table I.

ASME B1.20.1

Nominal Pipe Size	Outside Diam. of Pipe, D	Threads per Inch, n	Pitch of Thread, p	Pitch Diameter at Beginning of External Thread, E ₀	Handtight Engagement		Effective Thread, External	
					Length, ² L ₁ In.	Diam., ³ E ₁ In.	Length, ⁴ L ₂ In.	Diam., E ₂ In.
1/16	0.3125	27	0.03704	0.27118	0.160	0.28118	0.2611	0.28750
1/8	0.405	27	0.03704	0.36351	0.1615	0.37360	0.2639	0.38000
1/4	0.540	18	0.05556	0.47739	0.2278	0.49163	0.4018	0.50250
3/8	0.675	18	0.05556	0.61201	0.240	0.62701	0.4078	0.63750
1/2	0.840	14	0.07143	0.75843	0.320	0.77843	0.5337	0.79179
3/4	1.050	14	0.07143	0.96768	0.339	0.98887	0.5457	1.00179
1	1.315	11 1/2	0.08696	1.21363	0.400	1.23863	0.6828	1.25630
1 1/4	1.660	11 1/2	0.08696	1.55713	0.420	1.58338	0.7068	1.60130
1 1/2	1.900	11 1/2	0.08696	1.79609	0.420	1.82234	0.7235	1.84130
2	2.375	11 1/2	0.08696	2.26902	0.436	2.29627	0.7565	2.31630
2 1/2	2.875	8	0.12500	2.71953	0.682	2.76216	1.1375	2.79062
3	3.500	8	0.12500	3.34062	0.766	3.38850	1.2000	3.41562
3 1/2	4.000	8	0.12500	3.83750	0.821	3.88881	1.2500	3.91562
4	4.500	8	0.12500	4.33438	0.844	4.38712	1.3000	4.41562
5	5.563	8	0.12500	5.39073	0.937	5.44929	1.4063	5.47862
6	6.625	8	0.12500	6.44609	0.958	6.50597	1.5125	6.54062

All dimensions given in inches.

¹The basic dimensions of the ANSI Standard Taper Pipe Thread are Given in inches to four or five decimal places While this implies a greater degree of precision than is ordinarily attained, these dimensions are the basis of gage dimensions and are so expressed for the purpose of eliminating errors in computations.

²Also length of thin ring gage and length from gaging notch to small end of plug gage.

³Also pitch diameter at gaging notch (handtight plane).

American Pipe Threads

Nominal Pipe Size	Wrench Makeup Length for Internal Thread		Vanish Thread, (3.47 thds.), V	Overall Length External Thread, L ₄	Nominal Perfect External Threads ⁵		Height of Thread, h	Basic Minor Diam. at Small End of Pipe, K ₀
	Length, L ₃	Diam., E ₃			Length L ₅	Diam., E ₅		
1/16	0.1111	0.26424	0.1285	0.3896	0.1870	0.28287	0.02963	0.2416
1/8	0.1111	0.35656	0.1285	0.3924	0.1898	0.37537	0.02963	0.3339
1/4	0.1667	0.46697	0.1928	0.5946	0.2907	0.49556	0.04444	0.4329
3/8	0.1667	0.60160	0.1928	0.6006	0.2967	0.63056	0.04444	0.5676
1/2	0.2143	0.74504	0.2478	0.7815	0.3909	0.78286	0.05714	0.7013
3/4	0.2143	0.95429	0.2478	0.7935	0.4029	0.99286	0.05714	0.9105
1	0.2609	1.19733	0.3017	0.9845	0.5089	1.24543	0.06957	1.1441
1 1/4	0.2609	1.54083	0.3017	0.0085	0.5329	1.59043	0.06957	1.4876
1 1/2	0.2609	1.77978	0.3017	1.0252	0.5496	1.83043	0.06957	1.7205
2	0.2609	2.25272	0.3017	1.0582	0.5826	2.30543	0.06957	2.1995
2 1/2	0.2500 ⁸	2.70391	0.3017	1.5712	0.8875	2.77500	0.100000	2.6195
3	0.2500 ⁸	3.32500	0.4337	1.6337	0.9500	3.40000	0.100000	3.2406
3 1/2	0.2500	3.82188	0.4337	1.6837	1.0000	3.90000	0.100000	3.7375
4	0.2500	4.31875	0.4337	1.7337	1.0500	4.40000	0.100000	4.2344
5	0.2500	5.37511	0.4337	1.8400	1.1563	5.46300	0.100000	5.2907
6	0.2500	6.43047	0.4337	1.9462	1.2625	6.52500	0.100000	6.3461

⁴Also length of plug gage.

⁵The Length L₅ from the end of the pipe determines the plane beyond which the thread form is imperfect at the crest. The next two threads are perfect at the root. At this plane the cone formed by the crests of the thread intersects the cylinder forming the external surface of the pipe. L₅=L₂-2p.

⁶Given as information for use in selecting tap drills.

⁷Three threads for 2-inch size and smaller: two threads for larger sizes.

⁸Military Specification MIL-P-7105 gives the wrench makeup as three threads for 3 in. and smaller. The E₈ dimensions are then as follows: Size 2 1/2 in., 2.69609 and size 3 in., 3.31719.

Increase in diameter per thread is equal to 0.0625/n

Approximate Hardness Conversion Numbers For Nonaustenitic Steels^A(Rockwell B to Other Hardness Numbers)

Rockwell B SCALE, 100- kgf Load in(1.588- mm) Ball	Vickers Hardness Number	Brinell Indentation Diameter, mm	Brinell Hardness 3000-kgf Load, 10-mm Ball	Knoop Hardness 500-gf Load and Over	Rockwell A Scale, 60-kgf Load, Dia- mond Penetrator	Rockwell F Scale, 60-kgf Load, -in. (1.588-mm) Ball	Rockwell Superficial Hardness			Approximate Tensile Strength ksi(MPa)
							15T Scale, 15- kgf Load, -In. (1.588-mm) Ball	30T Scale, 30- kgf Load, -In. (1.588-mm) Ball	45T Scale, 45- kgf Load, -In. (1.588-mm) Ball	
100	240	3.91	240	251	61.5	...	93.1	83.1	72.9	116(800)
99	234	3.96	234	246	60.9	...	92.8	82.5	71.9	114(785)
98	228	4.01	228	241	60.2	...	92.5	81.8	70.9	109(750)
97	222	4.06	222	236	59.5	...	92.1	81.1	69.9	104(715)
96	216	4.11	216	231	58.9	...	91.8	80.4	68.9	102(705)
95	210	4.17	210	226	58.3	...	91.5	79.8	67.9	100(690)
94	205	4.21	205	221	57.6	...	91.2	79.1	66.9	98(675)
93	200	4.26	200	216	57.0	...	90.8	78.4	65.9	94(650)
92	195	4.32	195	211	56.4	...	90.5	77.8	64.8	92(635)
91	190	4.37	190	206	55.8	...	90.2	77.1	63.8	90(620)
90	185	4.43	185	201	55.2	...	89.9	76.4	62.8	89(615)
89	180	4.48	180	196	54.6	...	89.5	75.8	61.8	88(605)
88	176	4.53	176	192	54.0	...	89.2	75.1	60.8	86(590)
87	172	4.58	172	188	53.4	...	88.9	74.4	59.8	84(580)
86	169	4.62	169	184	52.8	...	88.6	73.8	58.8	83(570)
85	165	4.67	165	180	52.3	...	88.2	73.1	57.8	82(565)
84	162	4.71	162	176	51.7	...	87.9	72.4	56.8	81(560)
83	159	4.75	159	173	51.1	...	87.6	71.8	55.8	80(550)
82	156	4.79	156	170	50.6	...	87.3	71.1	54.8	77(530)
81	153	4.84	153	167	50.0	...	86.9	70.4	53.8	73(505)
80	150	4.88	150	164	49.5	...	86.6	69.7	52.8	72(495)
79	147	4.93	147	161	48.9	...	86.3	69.1	51.8	70(485)
78	144	4.98	144	158	48.4	...	86.0	68.4	50.8	69(475)
77	141	5.02	141	155	47.9	...	85.6	67.7	49.8	68(470)
76	139	5.06	139	152	47.3	...	85.3	67.1	48.8	67(460)
75	137	5.10	137	150	46.8	99.6	85.0	66.4	47.8	66(455)
74	135	5.13	135	147	46.3	99.1	84.7	65.7	46.8	65(450)
73	132	5.18	132	145	45.8	98.5	84.3	65.1	45.8	64(440)
72	130	5.22	130	143	45.3	98.0	84.0	64.4	44.8	63(435)
71	127	5.27	127	141	44.8	97.4	83.7	63.7	43.8	62(425)
70	125	5.32	125	139	44.3	96.8	83.4	63.1	42.8	61(420)
69	123	5.36	123	137	43.8	96.2	83.0	62.4	41.8	60(415)
68	121	5.40	121	135	43.3	95.6	82.7	61.7	40.8	59(405)
67	119	5.44	119	133	42.8	95.1	82.4	61.0	39.8	58(400)
66	117	5.48	117	131	42.3	94.5	82.1	60.4	38.7	57(395)
65	116	5.51	116	129	41.8	93.9	81.8	59.7	37.7	56(385)
64	114	5.54	114	127	41.4	93.4	81.4	59.0	36.7	...
63	112	5.58	112	125	40.9	92.8	81.1	58.4	35.7	...
62	110	5.63	110	124	40.4	92.2	80.8	57.7	34.7	...
61	108	5.68	108	122	40.0	91.7	80.5	57.0	33.7	...
60	107	5.70	107	120	39.5	91.1	80.1	56.4	32.7	...
59	106	5.73	106	118	39.0	90.5	79.8	55.7	31.7	...
58	104	5.77	104	117	38.6	90.0	79.5	55.0	30.7	...
57	103	5.81	103	115	38.1	89.4	79.2	54.4	29.7	...
56	101	5.85	101	114	37.7	88.8	78.8	53.7	28.7	...
55	100	5.87	100	112	37.2	88.2	78.5	53.0	27.7	...
54	...	...	...	111	36.8	87.7	78.2	52.4	26.7	...
53	...	...	...	110	36.3	86.5	77.9	51.7	25.7	...
52	...	...	...	109	35.9	86.0	77.5	51.0	24.7	...
51	...	...	...	108	35.5	85.4	77.2	50.3	23.7	...
50	...	...	...	107	35.0	84.8	76.9	49.7	22.7	...
49	...	...	...	106	34.6	84.3	76.6	49.0	21.7	...
48	...	...	...	105	34.0	83.7	76.2	48.3	20.7	...
47	...	...	...	104	33.7	83.1	75.9	47.7	19.7	...
46	...	...	...	103	33.3	...	75.6	47.0	18.7	...
45	...	...	...	102	32.9	82.6	75.3	46.3	17.7	...
44	...	...	...	101	32.4	82.0	74.9	45.7	16.7	...
43	...	...	...	100	32.0	81.4	74.6	45.0	15.7	...
42	...	...	...	99	31.6	80.8	74.3	44.3	14.7	...
41	...	...	...	98	31.2	80.3	74.0	43.7	13.6	...
40	...	...	...	97	30.7	79.7	73.6	43.0	12.6	...
39	...	...	...	96	30.3	79.1	73.3	42.3	11.6	...
38	...	...	...	95	29.9	78.6	73.0	41.6	10.6	...
37	...	...	...	94	29.5	78.0	72.7	41.0	9.6	...
36	...	...	...	93	29.1	77.4	72.3	40.3	8.6	...
35	...	...	...	92	28.7	76.9	72.0	39.6	7.6	...
34	...	...	...	91	28.2	76.3	71.7	39.0	6.6	...
33	...	...	...	90	27.8	75.7	71.4	38.3	5.6	...
32	...	...	...	89	27.4	75.2	71.0	37.6	4.6	...
31	...	...	...	88	2.70	74.6	70.7	37.0	3.6	...
30	...	...	...	87	26.6	74.0	70.4	36.3	2.6	...

^AThis table gives the approximate interrelationships of hardness values and approximate tensile strength of steels. It is possible that steels of various compositions and processing histories will deviate in hardness-tensile strength relationship from the data presented in this table. The data in this table should not be used for austenitic stainless steels but have been shown to be applicable for ferritic and martensitic stainless steels. Where more precise conversions are required, they should be developed specially for each steel composition, heat treatment, and part.

Approximate Hardness Conversion Numbers For Nonaustenitic Steels^A (Rockwell C to Other Hardness Numbers)

Rockwell D Scale, 50-kgf Load, Diamond Penetrator	Vickers Hardness Number	Brinell Indentation Diameter, mm	Brinell Hardness 30009-kgf Load, 10-mm Ball	Knoop Hardness 500-gf Load and Over	Rockwell A Scale, 60-kgf Load, Diamond Penetrator	Rockwell Superficial Hardness			
						15N Scale, 15-kgf Load, Diamond Penetrator	30N Scale 30-kgf Load, Diamond Penetrator	45N Scale, 45-kgf Load, Diamond Penetrator	Approximate Tensile Strength, ksi(MPa)
68	940	...	...	920	85.6	93.2	84.4	75.4	...
67	900	...	...	895	85.0	92.9	83.6	74.2	...
66	865	...	...	870	84.5	92.5	82.8	73.3	...
65	832	2.26	739	846	83.9	92.2	81.9	72.0	...
64	800	2.28	722	822	83.4	91.8	81.1	71.0	...
63	772	2.31	706	799	82.8	91.4	80.1	69.9	...
62	746	2.34	688	776	82.3	91.1	79.3	68.8	...
61	720	2.37	670	754	81.8	90.7	78.4	67.7	...
60	697	2.40	654	732	81.2	90.2	77.5	66.6	...
59	674	2.44	634	710	80.7	89.8	76.6	65.5	351(2420)
58	653	2.47	615	690	80.1	89.3	75.7	64.3	338(2330)
57	633	2.51	595	670	79.6	88.9	74.8	63.2	325(2240)
56	613	2.55	577	650	79.0	88.3	73.9	62.0	313(2160)
55	595	2.59	560	630	78.5	87.9	73.0	60.9	301(2070)
54	577	2.63	543	612	78.0	87.4	72.0	59.8	292(2010)
53	560	2.67	525	594	77.4	86.9	71.2	58.6	283(1950)
52	544	2.70	512	576	76.8	86.4	70.2	57.4	273(1880)
51	528	2.75	496	558	76.3	85.9	69.4	56.1	264(1820)
50	513	2.79	482	542	75.9	85.5	68.5	55.0	255(1760)
49	498	2.83	468	526	75.2	85.0	67.6	53.8	246(1700)
48	484	2.87	455	510	74.7	84.5	66.7	52.5	238(1640)
47	471	2.91	442	495	74.1	83.9	65.8	51.4	229(1580)
46	458	2.94	432	480	73.6	83.5	64.8	50.3	221(1520)
45	446	2.98	421	466	73.1	83.0	64.0	49.0	215(1480)
44	434	3.02	409	452	72.5	82.5	63.1	47.8	208(1430)
43	423	3.05	400	438	72.0	82.0	62.2	46.7	201(1390)
42	412	3.09	390	426	71.5	81.5	61.3	45.5	194(1340)
41	402	3.13	381	414	70.9	80.9	60.4	44.3	188(1300)
40	392	3.17	371	402	70.4	80.4	59.5	43.1	182(1250)
39	382	3.21	362	391	69.9	79.9	58.6	41.9	177(1220)
38	372	3.24	353	380	69.4	79.4	57.7	40.8	171(1180)
37	363	3.28	344	370	68.9	78.8	56.8	39.6	166(1140)
36	354	3.32	336	360	68.4	78.3	55.9	38.4	161(1110)
35	345	3.36	327	351	67.9	77.7	55.0	37.2	156(1080)
34	336	3.41	319	342	67.4	77.2	54.2	36.1	152(1050)
33	327	3.45	311	334	66.8	76.6	53.3	34.9	149(1030)
32	318	3.50	301	326	66.3	76.1	52.1	33.7	146(1010)
31	310	3.54	294	318	65.8	75.6	51.3	32.5	141(970)
30	302	3.59	286	311	65.3	75.0	50.4	31.3	138(950)
29	294	3.64	279	304	64.6	74.5	49.5	30.1	135(930)
28	286	3.69	271	297	64.3	73.9	48.6	28.9	131(900)
27	279	3.73	264	290	63.8	73.3	47.7	27.8	128(880)
26	272	3.77	258	284	63.3	72.8	46.8	26.7	125(860)
25	266	3.81	253	278	62.8	72.2	45.9	25.5	123(850)
24	260	3.86	247	272	62.4	71.6	45.0	24.3	119(820)
23	254	3.89	243	266	62.0	71.0	44.0	23.1	117(810)
22	248	3.93	237	261	61.5	70.5	43.2	22.0	115(790)
21	243	3.98	231	256	61.0	69.9	42.3	20.7	112(770)
20	238	4.02	226	251	60.5	69.4	41.5	19.6	110(760)

^AThis table gives the approximate interrelationships of hardness values and approximate tensile strength of steels. It is possible that steels of various compositions and processing histories will deviate in hardness-tensile strength relationship from the data presented in this table. The data in this table should not be used for austenitic stainless steels but have been shown to be applicable for ferritic and martensitic stainless steels. Where more precise conversions are required, they should be developed specially for each steel composition, heat treatment, and part.

Materials Specification For Butt-Weld Fittings

ASTM A234, A403, A420, A815 and A860

Marking Symbols	Materias		Chemical Composition(percent)						
	Grage	Thick.	Form	C	Si	Mn	P	S	Ni
WPB	A106 Gr. B	0~25mm 26~50 50~100	P	—	0.10min	0.29-1.06	0.048	0.058	—
	A515 Gr. 65		PL	0.28 0.31 0.33	0.13-0.45	0.90	0.035	0.040	—
	A515 Gr. 70		PL	0.31 0.33 0.35	0.13-0.45	1.30	0.035	0.040	—
WPC	A106 Gr. C		P	0.35	0.10min	0.29-1.06	0.048	0.058	—
WP1	A335 Gr. P1 A204 Gr. B		P PL	0.10-0.20 0.20-0.27	0.10-0.50 0.13-0.45	0.30-0.80 0.90	0.045 0.035	0.045 0.040	—
WP12	A335 Gr. P12 A387 Gr. 12		P PL	0.15 0.17	0.50 0.13-0.45	0.30-0.61 0.40-0.65	0.045 0.035	0.045 0.040	—
WP11	A335 Gr. P11 A387 Gr. 11		P PL	0.15 0.17	0.50-1.00 0.44-0.86	0.30-0.60 0.35-0.73	0.030 0.035	0.030 0.040	—
WP22	A335 Gr. P22 A387 Gr. 22		P PL	0.15 0.15-0.17	0.50 0.50	0.30-0.60 0.25-0.66	0.030 0.035	0.030 0.035	—
WP23	A335 P23		P	0.04-0.10	0.50	0.10-0.60	0.030	0.010	—
WP5	A335 Gr. P5 A387 Gr. 5		P PL	0.15 0.15	0.50 0.50	0.30-0.60 0.25-0.66	0.030 0.040	0.030 0.030	—
WP9	A335 P9 A387 Gr. 9		P PL	0.15 0.15	0.25-1.00 1.00	0.30-0.60 0.30-0.60	0.025 0.030	0.025 0.030	—
WP91	A335 P91 A387 Gr. 91		P PL	0.08-0.12	0.20-0.50	0.30-0.60	0.020	0.010	0.40
WP92	A335 P92		P	0.07-0.13	0.50	0.30-0.60	0.020	0.010	0.40
WP304	A312 Gr. TP304 A240 Type 304		P PL	0.08 0.08	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	8.00-11.00 8.00-10.50
WP304H	A312 Gr. TP304H A240 Type 304H*		P PL	0.04-0.10 0.04-0.10	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	8.00-11.00 8.00-10.50
WP304L	A312 Gr. TP304L† A240 Type 304L†		P PL	0.035 0.030	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	8.00-13.00 8.00-12.00
WP309	A312 Gr. TP309 A240 Type 309S		P PL	0.15 0.08	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	12.00-15.00 12.00-15.00
WP310	A312Gr. TP310 A240 Type 310S		P PL	0.15 0.08	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	19.00-22.00 19.00-22.00
WP347	A312 Gr. TP347 A240 Type347		P PL	0.08 0.08	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	9.00-13.00 9.00-13.00
WP316	A312 Gr. TP316 A240 Type316		P PL	0.08 0.08	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	11.00-14.00 10.00-14.00
WP316H	A312 Gr. TP316H A240 Type 316H*		P PL	0.04-0.10 0.40-1.10	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	11.00-14.00 10.00-14.00
WP316L	A312 Gr. TP316L A240 Type 316L†		P PL	0.035 0.030	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	10.00-15.00 10.00-14.00
WP321	A312 Gr. TP321 A240 Type 321		P PL	0.08 0.08	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	9.00-13.00 9.00-12.00
WP321H	A312 Gr. TP321H A240Type 321H*		P PL	0.04-0.10 0.04-0.10	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	9.00-13.00 9.00-13.00
WP347H	A312 Gr. TP347H A240 Type 347H*		P PL	0.04-0.10 0.04-0.10	0.75 1.00	2.00 2.00	0.040 0.045	0.030 0.030	9.00-13.00 9.00-13.00
WP S31254	A312 S31254 A240 S31254		P PL	0.020	0.80	1.00	0.030	0.010	17.5-18.5
WPL6	A333 end A334 Gr. 6 A516 Gr. 60	0~25mm 26~50 50~100	P PL	0.30 0.21 0.25	0.10min 0.13-0.45	0.29-1.06 0.60-1.30	0.048 0.035	0.058 0.040	—
WPL3	A333 and A334 Gr. 3 A203 Gr. D	0~50mm 50~100	P PL	0.19 0.17 0.20	0.18-0.37 0.13-0.45	0.31-0.64 0.70-0.80	0.050 0.035	0.050 0.040	3.18-3.82 3.18-3.82
WPL9	A333 and A334 Gr.8 A203 -Gr.A		P PL	0.20 0.17	— 0.15-0.40	0.40-1.06 0.70	0.025 0.035	0.025 0.040	1.60-2.24 2.10-2.50
S31803	A790 S31803 A240 S31803		P PL	0.030	1.0	2.0	0.030	0.020	4.50-6.50
S32750	A790 S32750 A240 S32750		P PL	0.030	0.8	1.2	0.035	0.020	6.0-8.0
S32760	A790 S32760 A240 S32760		P PL	0.030	1.00	1.00	0.030	0.010	6.00-8.00
WPHY42	AP15L Gr.X42 A572 Gr.42		P PL	0.28	—	1.25	0.04	0.05	—
WPHY60	AP15L Gr.X60 A572 Gr.60		P PL	0.26	—	1.35	0.04	0.05	—
WPHY65	AP15L Gr.X65 A572 Gr.65		P PL	0.26	—	1.40	0.04	0.05	—

- Asterisks(*) denote that the carbon content shall be 0.04 to 0.10%
- Daggers(†) denote that the minimum tensile strength shall be 65,000 psi(450 MPa) and that the minimum yield strength shall be 25,000 psi(170 MPa)
- The yield strength shall be determined by the offset method at 0.2% limiting permanent set in accordance with ASTM A370 Specification An alternative method of determining yield strength may be based on a total extension under load of 0.5%
- The basic minimum elongation for walls 3/16"(7.94mm) and over in thickness shall be determined according to strip tests:all small sizes are tested in their full section
- P-denotes Pipe, PL Plate

Materials Specification For Butt-Weld Fittings

			Tensile Requirements				Marking Symbols
Cr	Mo	Ti	Other Element	Tensile Strength Min. or Range Ksi(Mpa)	Yield Strength Min. Ksi(Mpa)	Longitudinal Elongation in 2 in.(50mm) Min. %	
—	—	—	—	60 (415)	35 (240)	30	WPB
—	—	—	—	65-85(450-585)	35 (240)	23	
—	—	—	—	70-90(485-620)	38 (260)	21	
—	—	—	—	70 (485)	40 (275)	30	
—	0.44-0.65	—	—	55 (380)	30(205)	30	
—	0.41-0.64	—	—	70-90(485-620)	40(275)	21	
0.80-1.25	0.44-0.65	—	—	60 (415)	30 (205)	30	WP12
0.74-1.21	0.40-0.65	—	—	65-85(450-585)	40 (275)	22	
1.00-1.50	0.44-0.65	—	—	60 (415)	30 (205)	30	WP11
0.94-1.56	0.40-0.70	—	—	70-100(515-690)	45 (310)	22	
1.90-2.60	0.87-1.13	—	—	60 (415)	30 (205)	30	WP22
1.88-2.62	0.85-1.15	—	—	75-100(515-690)	45(310)	18	
1.90-2.60	0.05-0.30	—	V : 0.20-0.30 Cb: 0.02-0.08 B : 0.0005-0.006 N : 0.030 Al : 0.030 W : 1.45-1.75	74	58	20	WP23
4.00-6.00	0.45-0.65	—	—	60 (415)	30 (205)	30	WP5
4.00-6.00	0.40-0.70	—	—	75-100(515-690)	45 (310)	18	
8.00-10.00	0.90-1.10	—	—	60 60-85	30 30	30 18	WP9
8.00-9.50	0.85-1.05	—	V : 0.18-0.25 Cb: 0.06-0.10 N : 0.0300.70 Al : 0.04	85 85-110	60 60	20 18	WP91
8.50-9.50	0.30-0.60	—	V : 0.15-0.25 Cb: 0.04-0.09 B : 0.001-0.006 N : 0.03-0.07 Al : 0.04 W : 1.50-2.00	90	64	20	WP92
18.00-20.00	—	—	—	75 (515)	30 (205)	35	WP304
18.00-20.00	—	—	—	75 (515)	30 (205)	40	
18.00-20.00	—	—	—	75 (515)	30 (205)	35	WP304H
18.00-20.00	—	—	—	75 (515)	30 (205)	40	
18.00-20.00	—	—	—	70 (485)	25 (170)	35	WP304L
22.00-24.00	—	—	—	70 (485)	25 (170)	40	
22.00-24.00	—	—	—	75 (515)	30 (205)	35	WP309
24.00-26.00	—	—	—	75 (515)	30 (205)	35	
24.00-26.00	—	—	—	75 (515)	30 (205)	40	WP310
17.00-20.00	—	—	Cb+Ta10×C-1.00 Cb+Ta10×C-1.10	75 (515)	30 (205)	35	WP347
17.00-19.00	—	—		75 (515)	30 (205)	40	
16.00-18.00	2.00-3.00	—	—	75 (515)	30 (205)	35	WP316
16.00-18.00	2.00-3.00	—	—	75 (515)	30 (205)	40	
16.00-18.00	2.00-3.00	—	—	70 (485)	25 (170)	35	WP316H
16.00-18.00	2.00-3.00	—	—	70 (485)	25 (170)	40	
17.00-20.00	—	5XC-0.60	—	75 (515)	30 (205)	35	WP321
17.00-19.00	—	5XC-0.70	—	75 (515)	30 (205)	40	
17.00-20.00	—	4XC-0.60	—	75 (515)	30 (205)	35	WP321H
17.00-19.00	—	4XC-0.70	—	75 (515)	30 (205)	40	
17.00-20.00	—	—	Cb+Ta8×C-1.0 Cb+Ta8×C-1.0	75 (515)	30 (205)	35	WP347H
17.00-19.00	—	—		75 (515)	30 (205)	40	
19.5-20.5	6.00-6.50	—	N:0.18-0.22 Cu:0.50-1.00	94(650)	44(300)	35	S31254
—	—	—	—	60 (414)	35 (241)	30	WPL6
—	—	—	—	60-80(415-550)	32 (220)	25	
—	—	—	—	65 (448)	35 (241)	30	WPL3
—	—	—	—	65-85(450-585)	37 (255)	23	
—	—	—	Cu:0.7-1.25	63 (435)	46(315)	28	WPL9
—	—	—	—	65-85(450-585)	37(255)	23	
21.0-23.0	2.50-3.50	—	N:0.08-0.20	90 (620)	65(450)	25	S31803
24.0-26.0	3.0-5.0	—	N:0.24-0.32 Cu:0.5	116 (795)	80(550)	15	S32750
24.00-26.00	3.00-4.00	N:0.20-0.30 Cu:0.50-1.00 W:0.50-1.00 Cr+3.3 Mo+16N=40min	109-130(750-895)	108 (750) 109-130(750-895)	80(550)	25	S32760
—	—	—	—	60 (414)	42(289)	—	WPHY42
—	—	0.03 Min.	Cb:0.005min. V:0.02min.	75 (517)	60(413)	18	WPHY60
—	—	—	Cb:0.005min. V:0.02min.	77(530) 80(550)	65(448)	17	WPHY65

Comparison of ASTM Specification and Similar Standards

Steel Composition	ASTM Specification and Grade				KS Specification and Grade
	Marking Symbol	Pipe	Plate	Forgings	
Carbon Steel	—	A120	A283-A	—	SPP
Carbon Steel	—	A53-B	A242	—	SPPS38
Carbon Steel	—	A53-B	A242	—	SPPS42
Carbon Steel	WPB	A106-B	A515-65 or 70	A181-2 and A105	SPHT42
Carbon Steel	WPC	A106-C	—	—	SPHT49
Carbon Steel	WPL6	A333 and A334-6	A516-60	A350-LF2	SPLT39
3½ % Ni Steel	WPL3	A333 and A334-3	A203-D	A350-LF3	—
2%Ni-1% Cu Steel	WPL9	A333 and A334-9	A203-A	A350-LF9	—
Carbon-Molybdenum Steel	WP1	A335-P1	A204-B	A182-F1	SPA12
1% Cr-½% Molybdenum Steel	WP12	A335-P12	A387-12	A182-F12	SPA22
1¼ % Cr-½% Molybdenum Steel	WP11	A335-P11	A387-11	A182-F11	SPA23
2½ Cr-1% Molybdenum Steel	WP22	A335-P22	A387-22	A182-F22	SPA24
5% Cr-½% Molybdenum Steel	WP5	A335-P5	A387-5	A182-F5	SPA25
7% Cr-½% Molybdenum Steel	WP7	A335-P7	—	A182-F7	—
9% Cr-1% Molybdenum Steel	WP9	A335-P9	—	A182-F9	—
9% Cr-1% Mo-0.2%V+Cb+N	WP91	A335-P91	A387-91	A182-F91	—
18% Cr-8% Ni Steel	WP304	A312-TP304	A240-Type304	A182-F304	STS304TP
18% Cr-8% Ni-(0.04-0.10)% C Steel	WP304H	A312-TP304H	A240-Type304H	A182-F304H	—
18% Cr-8% Ni-0.035% C Steel	WP304L	A312-TP304L	A240-Type304L	A182-F304L	STS304LTP
22% Cr-12% Ni Steel	WP309	A312-TP309	A240-Type309S	—	STS309STP
25% Cr-20% Ni Steel	WP310	A312-TP310	A240-Type310S	A182-F310	STS310STP
18% Cr-8% Ni-Cb+ Ta Steel	WP347	A312-TP347	A240-Type 347	A182-F347	STS347TP
18% Cr-8% Ni-Mo Steel	WP316	A312-TP316	A240-Type316	A182-F316	STS316TP
18% Cr-8% Ni-Mo-(0.04-0.10)% C Steel	WP316H	A312-TP316H	A240-Type316H	A182-F316H	STS316HTP
18% Cr-8% Ni-Mo-0.035% C Steel	WP316L	A312-TP316L	A240-Type316L	A182-F316L	STS316LTP
18% Cr-8% Ni-Ti Steel	WP321	A312-TP321	A240-Type321	A182-F321	STS321TP
18% Cr-8% Ni-Ti-(0.04-0.10)% C Steel	WP321H	A312-TP321H	A240-Type321H	A182-F321H	—
18% Cr-8% Ni-Cb+Ta-(0.04-0.10)% C Steel	WP347H	A312-TP347H	A240-Type347H	A182-F347H	STS347HTP

Comparison of ASTM Specification and Similar Standards

KS Specification and Grade	JIS Grade		B.S. Specification and Grade	DIN Specification and Grade	Steel Composition
	Plate	Pipe	Plate	Pipe	
SB41	SGP	SS41	1378-M	2440-ST33-1	Carbon Steel
SWS41B	STPG370	SM41B	3602-ERW23	1626-ST37	Carbon Steel
SWS41B	STPG410	SM41B	3602-ERW27	—	Carbon Steel
SBB42	STPT410	SB42	3602-Steel 27	17175-St 45.8	Carbon Steel
SBB49	STPT480	SB49	3602-Steel 35	—	Carbon Steel
SLAL39	STPL380	—	3603-Steel 27 LT30	—	Carbon Steel
—	STPL450	—	3603-Steel 503 LT100	—	3½% Ni Steel
—	STPL690	—	—	—	2% Ni-1% Cu Steel
SBB46M	STPA12	—	—	17175-15 Mo3	Carbon-Molybdenum Steel
SCMV2	STPA22	—	3604-HF620	17175-13CrMo44	1% Cr-½ Molybdenum Steel
SCMV3	STPA23	—	3604-HF621	—	1¼% Cr-½% Molybdenum Steel
SCMV4	STPA24	—	3604-HF622, 27	17175-10CrMo910	2¼% Cr-1% Molybdenum Steel
SCMV6	STPA25	—	3604-HF625	—	5% Cr-½% Molybdenum Steel
—	—	—	—	—	7% Cr-½% Molybdenum Steel
—	STPA26	—	—	—	9% Cr-1% Molybdenum Steel
—	—	—	—	—	9% Cr-1% Mo-0.2%V+Cb+N
STS304	SUS304TP	SUS304	3605-801	17440-X5CrNi189	18% Cr-8% Ni Steel
—	SUS304HTP	—	3605-811	—	18% Cr-8% Ni-(0.04-0.10)% C Steel
STS304L	SUS304LTP	SUS304L	3605-811L	17440-X2CrNi189	18% Cr-8% Ni-0.035% C Steel
STS309S	SUS309STP	SUS309S	—	—	22% Cr-12% Ni Steel
STS310S	SUS310STP	SUS310S	3605-805S	—	25% Cr-20% Ni Steel
STS347	SUS347TP	SUS347	3605-822 Nb	17440-X 0CrNiNb189	18% Cr-8% Ni-Cb+Ta Steel
STS316	SUS316TP	SUS316	3605-845	17440-X5CrNiMo1810	18% Cr-8% Ni-Mo Steel
—	SUS316HTP	—	3605-855	—	18% Cr-8% Ni-Mo-(0.04-0.10)% C Steel
STS316L	SUS321LTP	SUS316L	3605-845L	17440-X2CrNiMo1810	18% Cr-8% Ni-Mo-0.035% C Steel
STS321	SUS321TP	SUS321	3605-822Ti	17440-X10CrNiTi89	18% Cr-8% Ni-Ti Steel
—	SUS321HTP	—	3605-832Ti	—	18% Cr-8% Ni-Ti-(0.04-0.10)% C Steel
—	SUS347HTP	—	3605-832Nb	—	18% Cr-8% Ni-Cb+Ta-(0.04-0.10)% C Steel

Dimensions of Welded and Seamless Pipe

Carbon, Alloy and Stainless Steel

ASME B36.10M, B36.19M

(in millimeters)

Nominal Pipe Size (in inches)	Outside Diameter	Nominal Wall Thickness								
		Sch 5S	Sch 10S	Sch 10	Sch 20	Sch 30	Sch 40S	STD	Sch 40	Sch 60
1/8	10.29	—	1.24	—	—	—	1.73	1.73	1.73	—
1/4	13.72	—	1.65	—	—	—	1.73	1.73	2.24	—
3/8	17.14	—	1.65	—	—	—	2.31	2.31	2.31	—
1/2	21.34	1.65	2.11	—	—	—	2.77	2.77	2.77	—
5/8	26.67	1.65	2.11	2.11	—	—	2.87	2.87	2.87	—
1	33.40	1.65	2.77	2.77	—	—	3.38	3.38	3.38	—
1 1/4	42.16	1.65	2.77	2.77	—	—	3.56	3.56	3.56	—
1 1/2	48.26	1.65	2.77	2.77	—	—	3.68	3.68	3.68	—
2	60.32	1.65	2.77	2.77	—	—	3.91	3.91	3.91	—
2 1/2	73.02	2.11	3.05	3.05	—	—	5.16	5.16	5.16	—
3	88.90	2.11	3.05	3.05	—	—	5.49	5.49	5.49	—
3 1/2	101.60	2.11	3.05	3.05	—	—	5.74	5.74	5.74	—
4	114.30	2.11	3.05	3.05	—	—	6.02	6.02	6.02	—
5	141.30	2.77	3.40	3.40	—	—	6.55	6.55	6.55	—
6	168.28	2.77	3.40	—	—	—	7.11	7.11	7.11	—
8	219.08	2.77	3.76	—	6.35	7.04	8.18	8.18	8.18	10.31
10	273.05	3.40	4.19	—	6.35	7.80	9.27	9.27	9.27	12.70
12	323.85	3.96	4.57	—	6.35	8.38	9.52	9.52	10.31	14.27
14	355.60	3.96	4.78	6.35	7.92	9.52	—	9.52	11.13	15.06
16	406.40	4.19	4.78	6.35	7.92	9.52	—	9.52	12.70	16.66
18	457.20	4.19	4.78	6.35	7.92	11.12	—	9.52	14.27	19.05
20	508.00	4.78	5.54	6.35	9.52	12.70	—	9.52	15.06	20.62
22	558.8	4.78	5.54	6.35	9.52	12.70	—	9.52	15.87	22.22
24	609.6	5.54	6.35	6.35	9.52	14.27	—	9.52	17.48	24.61
26	660.4	—	—	7.92	12.70	—	—	9.52	—	—
28	711.2	—	—	7.92	12.70	15.88	—	9.52	—	—
30	762.0	6.35	7.92	7.92	12.70	15.88	—	9.52	—	—
32	812.8	—	—	7.92	12.70	15.88	—	9.52	17.48	—
34	863.6	—	—	7.92	12.70	15.88	—	9.52	17.48	—
36	914.4	—	—	7.92	12.70	15.88	—	9.52	19.05	—
38	965.2	—	—	—	—	—	—	9.52	—	—
40	1016.0	—	—	—	—	—	—	9.52	—	—
42	1066.8	—	—	—	—	—	—	9.52	—	—
44	1117.6	—	—	—	—	—	—	9.52	—	—
46	1168.4	—	—	—	—	—	—	9.52	—	—
48	1219.2	—	—	—	—	—	—	9.52	—	—

Dimensions of Welded and Seamless Pipe

Carbon, Alloy and Stainless Steel

ASME B36.10M, B36.19M

(in millimeters)

Nominal Wall Thickness								Outside Diameter	Nominal Pipe Size (in inches)
Sch 80S	XS	Sch 80	Sch 100	Sch 120	Sch 140	Sch 160	XXS		
2.41	2.41	2.41	—	—	—	—	—	10.29	1/8
3.02	3.02	3.02	—	—	—	—	—	13.72	1/4
3.20	3.20	3.20	—	—	—	—	—	17.14	3/8
3.73	3.73	3.73	—	—	—	4.75	7.47	21.34	1/2
3.91	3.91	3.91	—	—	—	5.54	7.82	26.67	3/4
4.55	4.55	4.55	—	—	—	6.35	9.09	33.40	1
4.85	4.85	4.85	—	—	—	6.35	9.70	42.16	1 1/4
5.08	5.08	5.08	—	—	—	7.14	10.16	48.26	1 1/2
5.54	5.54	5.54	—	—	—	8.71	11.07	60.32	2
7.01	7.01	7.01	—	—	—	9.52	14.02	73.02	2 1/2
7.62	7.62	7.62	—	—	—	11.13	15.24	88.90	3
8.08	8.08	8.08	—	—	—	—	16.15	101.60	3 1/2
8.56	8.56	8.56	—	11.13	—	13.49	17.12	114.30	4
9.53	9.53	9.53	—	12.70	—	15.88	19.05	141.30	5
10.97	10.97	10.97	—	14.27	—	18.24	21.95	168.28	6
12.70	12.70	12.70	15.06	18.26	20.62	23.01	22.22	219.08	8
12.70	12.70	15.06	18.26	21.44	25.40	28.58	25.40	273.05	10
12.70	12.70	17.48	21.44	25.40	28.58	33.32	25.40	323.85	12
12.70	19.05	23.83	27.79	31.75	35.71	—	—	355.60	14
12.70	21.44	26.19	30.96	36.52	40.46	—	—	406.40	16
12.70	23.82	29.36	34.92	39.67	45.24	—	—	457.20	18
12.70	26.19	32.54	38.10	44.45	49.99	—	—	508.00	20
12.70	28.58	34.92	41.28	47.62	53.98	—	—	558.8	22
12.70	30.93	38.89	46.02	52.37	59.51	—	—	609.6	24
12.70	—	—	—	—	—	—	—	660.4	26
12.70	—	—	—	—	—	—	—	711.2	28
12.70	—	—	—	—	—	—	—	762.0	30
12.70	—	—	—	—	—	—	—	812.8	32
12.70	—	—	—	—	—	—	—	863.6	34
12.70	—	—	—	—	—	—	—	914.4	36
12.70	—	—	—	—	—	—	—	965.2	38
12.70	—	—	—	—	—	—	—	1016.0	40
12.70	—	—	—	—	—	—	—	1066.8	42
12.70	—	—	—	—	—	—	—	1117.6	44
12.70	—	—	—	—	—	—	—	1168.4	46
12.70	—	—	—	—	—	—	—	1219.2	48